TECHNICAL SPECIFICATIONS

FOR

PAVEMENTS MAINTENANCE AND REPAIR

INDEFINITE DELIVERY INDEFINITE QUANTITY CONTRACT

PREPARED BY AFRL/RIOC

AIR FORCE RESEARCH LABORATORY
ROME RESEARCH SITE
ROME, NEW YORK

PROJECT NR: ULDF 09-0414 **DATED**: 03 February 2009

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SECTION 01000

GENERAL REQUIREMENTS

1.0 WORK SCHEDULE

Working hours for the contractor will normally be between the hours of 0700 and 1600, excluding Saturdays, Sundays and federal holidays. If the contractor desires to work during periods other than above, additional Government inspection forces may be required. The contractor must make his/her request to the Contracting Officer three days in advance of his/her intention to work during other periods to allow for assignment of additional inspection forces. If such force is reasonably available, the Contracting Officer may authorize the contractor to perform work during periods other than normal duty hours/days.

2.0 DIGGING PERMITS

A. The contractor shall have an approved Contracting Officer's Work Clearance Permit in his possession before any excavation work is permitted:

1. Fourteen (14) calendar days prior to any planned excavation, the contractor shall notify the Contracting Officer in writing of his request to obtain a Work Clearance Permit (digging permit).

2. Work clearance permits are processed by the Contract Management Office (RIOCO) of Rome Research Site Civil Engineering upon receipt of request from the Contracting Officer.

3. The contractor shall have staked the area of excavation prior to initiating request.

4. Upon receipt of request, RIOCO will notify AFRL/RIOCC and other appropriate offices for location of underground communication and other utility lines within the staked areas of excavation.

5. The contractor shall hand-excavate the immediate area where communication and utility lines are identified. In areas of uncertainty where communication and utility lines are known to exist, but the location is uncertain, Government personnel, given a minimum of fourteen (14) days notice by RIOCO, will indicate locations in the field.

6. The contractor shall hand excavate the immediate area where communication and utility lines have been located in the field.

7. All excavation work in the above described known and uncertain areas where communication and other utilities have been identified and staked shall be hand-excavated by the contractor a minimum of five feet on both sides of staked areas.

8. If staked lines in these areas are not found, the contractor shall notify RIOCO immediately before proceeding with any further excavation.

B. The contractor shall notify the Contracting Officer fourteen (14) days prior to the start of demolition or excavation work.

3.0 ELECTRICAL SERVICE AND COMMUNICATIONS FACILITIES

The contractor will not disturb electrical and/or communications facilities and wiring. Where such facilities require removal, the contractor shall notify the Contracting Officer at least seven calendar days in advance of the requirement, for the accomplishment of such removals by the Government. The contractor shall allow the telephone company and communication personnel to be present during digging. If electrical and/or communication facilities are damaged by the contractor, the contractor shall restore them within 24 hours.

4.0 EXISTING FACILITIES

The existing dimensions and locations shown on the applicable drawings are for approximation purposes only. Failure to verify the dimensions and locations will be at the contractor's risk and shall not relieve the contractor from accomplishing the work required by the contract at the price awarded by the government.

5.0 SUBMITTALS

Submittals will be required on materials used under each proposal. Each submittal shall include information as described in the technical specifications or as shown on the drawings. Submittals will accompany the contractor's proposal on each project. Once an item of material or equipment has been approved, the contractor will not be required to resubmit with the following exception: if, at any time during the duration of this contract, the contractor desires to change materials from those originally approved, his new materials shall be resubmitted to and approved by the Contracting Officer prior to incorporation into the project. Submission will be on an AF Form 3000.

6.0 MATERIAL REMOVED

All materials removed from and not reused in the project and specified herein or shown on the applicable drawings remain the property of the Government, except as noted below: The Contracting Officer will determine if materials removed from the job site are salvageable or unsalvageable. Salvageable materials shall be disposed of as directed by the Contracting Officer. Materials to be removed shall be removed without damage to adjacent areas. All damage resulting from removal shall be repaired by the contractor with materials of like nature, type and construction as were damaged or exist adjacent to the areas to be repaired. When material is designated as unsalvageable, the material from that point shall become the property of the contractor. The disposal of any materials removed from this project shall be accomplished in

accordance with all applicable state, federal and local statutes, regulations, and executive orders in effect at the time of disposal. Materials excavated shall be removed from the work site on the day of excavation.

7.0 CONTRACTOR STORAGE

An area for each delivery order shall be provided to the contractor by the Government. No permanent storage area is available at the site. An open storage area will be provided. Security shall be the responsibility of the contractor. The contractor shall keep the storage area neat, orderly and clear of all debris. The contractor shall not allow trash or other debris to scattered from his area by wind or other means. The open area provided to the contractor must be surrounded by a chain link fence and must be maintained in a serviceable condition at all times. The fence line will be kept clear of weeds and trash. The grass area around the open storage area for a distance of 25 ft. will be maintained (cut) as a lawn.

8.0 UTILITIES SERVICE

The Government will provide utilities (electricity, gas and water) when readily available at the construction site. No utilities will be provided by the government at the contractor open storage area. Hookup is a contractor responsibility. The contractor shall return the hook up sites to their original configuration should they be altered to facilitate the hook up.

9.0 NOT USED

10.0 SCHEDULING WORK

a. Before any or the work is initiated under an individual delivery order, the contractor shall confer with the Contracting Officer or his representative(s) and agree on a sequence of procedure; means of access to worksite; space for storage of materials and equipment; delivery of materials and use of approaches; means of communications; the location of eating spaces and restrooms for contractor's employees.

b. Delivery of materials and equipment shall be made with a minimum of interference to Government operations and personnel.

c. The work shall, so far, as practicable, be done in definite sections or divisions and confined to limited areas which shall be completed before work in other sections or divisions is begun.

11.0 CONSTRUCTION SITE MAINTENANCE

Store all supplies and equipment on protected site so as to preclude theft or damage. Maintain site in a neat and orderly manner.

12.0 NOISE CONTROL

Comply with all applicable state, local and installation laws, ordinances, and regulations relative to noise control.

13.0 TRUCKING

Loose debris on trucks leaving the site shall be loaded in a manner that will prevent dropping of material on streets and conform to local ordinances and laws. Fasten suitable cover, such as a tarpaulin, over the load before entering surrounding streets. The contractor shall be responsible for cleaning up any materials that fall from trucks.

14.0 GOVERNMENT LIABILITY

The Government shall not be liable for any loss or damage to the contractor's property, including stock or for expense incidental to such loss or damage.

15.0 TOILET FACILITIES, (WORK RELATED)

Contractor's personnel will be permitted to use existing toilet facilities if available on the premises subject to approval of the Contracting Officer or his designated representative.

16.0 AS-BUILT STATEMENT

The Government does not guarantee the accuracy or adequacy of existing as-built drawings. It is the contractor's responsibility to verify all as-built conditions prior to the issuance of each delivery order.

17.0 REQUIRED DATE FOR MATERIAL SUBMITTAL/SHOP DRAWINGS

a. Contractor shall submit shop drawings and material submittals within five (5) days after receipt of the Delivery Order, or as otherwise established by the Contracting Officer.

b. All shop drawings and materials submittals shall be prepared and submitted in accordance with paragraph entitled "Preparation of Material Approval Submittals".

19.0 FIRE PROTECTION

The contractor shall perform all work in a fire-safe manner in accordance with fire prevention standards of the Rome Research Site. The contractor shall have an approved fire extinguisher at the site at all times during working operations. HALON AND C02 TYPE FIRE EXTINGUISHERS ARE NOT AUTHORIZED FOR USE. The contractor will notify the construction representative, before working with any flame or spark producing equipment such

as tar buckets, grinders, or welders, for approval of the contractors' safety measures and to obtain a "Burn Permit" for this type of work.

20.0 SECURITY REQUIREMENTS

a. The work to be done on this project is located in and around area's that are under the scrutiny of the Department of Defense Police assigned to the RRS Information Directorate. To gain access to the area(s) to examine the work to be done for job estimation purposes; arrangements must be made through the Contracting Office. Contractor personnel will be escorted into the area(s) for the purpose of project estimation.

b. When it has been determined which Contractor will accomplish the project a Visit Request from the company, preferably on Company letterhead, will be necessary prior to initial work commencement. The Visit Request letter needs to be signed by the Company President or Director of Human Resources. The Visit Request will also be used as the Entry Authority List. The Contractor will supply the Visit Request to Security (AFRL/RIOF) through the Contracting Office. The Visit Request can be done via RRS Visit Request Form, AFMC Form 97 (found on the AFRL web page, https://rlweb.rl.af.mil/security/) or a simple Company Letterhead letter identifying all personnel who will be employed during the work. The request will contain a full name to include a middle initial (Frank A. Dude), date of birth (14 Dec 1953), state of driver's license issuance and place of birth (Austin, Texas). This information will be used to do a Local Files Check. This check will provide Drivers License Info, Wants & Warrants and Protection Orders and will also provide information on Illegal Immigration and suspected terrorist affiliations. The Local Files Check will also be accomplished prior to work commencing. If the individual is not a US Citizen they will not be allowed within the complex or facilities. If, the individual is not a US Citizen but has a Green Card, Form I-551 or has the I-551 stamp on their passport, Security will need to see either one. There will be no foreign national workers allowed on the Rome Research Site.

c. Provide the Company's phone number and a Project Leaders or Supervisor/Foremen cell-phone number is necessary for the Law Enforcement Desk Sergeant.

d. All facilities are entered using a magnetic media entry badge. Any personnel such as Supervisor/Foremen or Project Leaders who may need building access for meetings etc, during contract period, can acquire a Local Contractor Entry Badge through the Division/Branch with oversight of the work. This will be accomplished with the RRS Form 110 (Unescorted Visitor Badge). The Security Visitation Office is located in the lobby of Bldg 3, West Wing. This badge will be worn at all times within the facility. These badges will be returned to the Contracting Officer's Technical Representative upon completion of the final inspection and Acceptance of Work. Any badges lost during the period of work will be reported to Security as soon as possible.

e. Access to the RRS Complex is controlled by a Main Gate on Brooks Rd, located just west of the Otis & Brooks intersection. Identification for the contractor to enter with a vehicle will be an access list supported by the electronic badge issued. All commercial vehicles entering the gate will be searched. One-time deliveries can be escorted from the gate to delivery point by project personnel.

f. All commercial vehicles are searched prior to entry into the RRS Complex. Vehicle operators will be aware of the vehicle search pull-off area prior to approaching the Main Gate. A search of the vehicle will be conducted prior to its entry. All vehicles not needed for delivery of equipment or tools will be parked in the visitor parking area unless cleared through Security. There are No vehicles allowed within 25 meters (80 ft) of the RRS facilities.

g. All personnel should be aware that the Rome Research Site is Property of the United States Air Force. All personnel will follow all posted signage.

h. Contractor personnel will be notified by RRS Police of any emergencies which would require an evacuation or work stoppage, such as an increase in the Force Protection Condition.

i. Building/Room Keys: If the contractor needs access to area(s) that are locked (i.e. mechanical rooms, janitor's closet, etc.), a request for entry of at least 2 working days prior to the need for access will be submitted to AFRL/RIOC construction representative. The area(s) will be provided on a daily basis. The area(s) will be locked down at the end of the days work.

j. The 24 hour Desk Sgt can be reached at 330-2961.

SECTION 01010

SUMMARY OF WORK

1.0 GENERAL

1.1 Location: The work to be accomplished under this project is at Air Force Research Laboratory, Rome Research Site (RRS).

1.2 Description: The project consists of furnishing all labor, materials and equipment required for a broad range of maintenance, repair, and minor construction work on various pavements, drainage facilities and associated grounds at Air Force Research Laboratory (AFRL), Rome Research Site, Rome, New York and all associated sites (Newport Test Annex 1, Newport Test Annex 2, and Stockbridge Test Annex) as well as the Defense Finance and Accounting Services.

2.0 PRODUCTS

2.1 Submittal Requirements: Reproducible shop drawings, manufacturers' data, dated certifications and test reports, and samples constitute the project submittals. All submittals shall have an AF Form 3000 attached and be submitted in triplicate.

3.0 EXECUTION

3.1 Fire Protection: The contractor shall be responsible for furnishing adequate and proper fire protection for all phases of the contract work.

3.2 Methods and Materials: Unless specified otherwise here-in all work and materials shall conform with the requirements of:

"Standard Specifications - Construction and Materials"
By
Department of Transportation
State of New York
Dated: May 1, 2008

3.2.1 All references to "New York State Department of Transportation", "Commissioner of Transportation", "Regional Director", "Regional Office", etc., shall be understood to mean "United States Government and/or Contracting Officer.

3.2.2 All New York State Department of Transportation paragraphs concerning Methods of Measurement and Basis of Payment shall be disregarded.

3.2.3 Hard copies of "Standard Specifications" may be obtained for a nominal fee from:

Plans Sales Department - Room #1206
Region No. 2
New York State Department of Transportation
207 Genesee Street
Utica, NY 13501
Phone: 315-793-2438

Electronic copies may be downloaded at no cost at https://www.nysdot.gov/main/business-center/engineering/specifications

3.3 Reference Standards and Publications: The standards and publications listed in each section of these specifications form part of these specifications to the extent referenced. The contractor shall conform to the provision of the dated issue of the listed standard or publication.

3.3.1 Standard details are available in the NYS Comprehensive Pavement Design Manual which can be downloaded at no cost at https://www.nysdot.gov/divisions/engineering/design/dqab/cpdm

3.4 All work under this contract shall meet or exceed trade standards, and in a condition acceptable to the Contracting Officer. This shall be the required condition at the time of acceptance of all work under this contract.

3.5 Clean-up: The contractor shall at all times, keep the construction area, including storage areas used by him, free from accumulation of waste materials or rubbish. Prior to completion of the work each day, remove from the construction site all waste materials or rubbish. Upon completion of the construction, the contractor shall leave the work premises in a clean, neat condition.

3.6 Hazardous Substances: The contractor shall report any spill of oil or hazardous material to the New York State Spill Hotline at 1-800-457-7362 and RIOCV at 330-2098 and take every reasonable precaution to prevent or contain the spillage of oil or other hazardous substances.

3.7 Traffic and Coordination of Work: The contractor shall coordinate all phases of work with the Contracting Officer. A detailed time schedule shall be submitted within five (5) calendar days after receipt of the written Notice to Proceed. The submittal shall also include a layout of traffic flow including a description of permanent, temporary, and handheld signs and safety gear to be used by the flag persons. It is the intent of this contract for all work to be performed in an orderly manner with minimum disturbance and inconvenience to vehicular and pedestrian traffic. Work must progress and be complete in one area prior to commencement of a new area of work except as permitted by the Contracting Officer. The contractor shall provide traffic control; no assistance from Security Police will be provided. If the contractor uses off-duty base personnel as flag persons, the contractor must get their use cleared through the Contracting Officer.

3.8 Protection of Work Site: The contractor shall be responsible for protection of his work and existing Government property. Any items of Government property damaged by the contractor's operations shall be repaired or replaced.

3.9 Burning: Burning of material and debris is not permitted.

3.10 Special Conditions:

3.10.1 The contractor shall be responsible for the furnishing and placing of barricades to prevent vehicular traffic access within the limit of work.

3.10.2 The contractor shall be responsible for furnishing and installing barricade barrels, flagging and ropes around all areas of excavation. Barricades shall be equipped with flashing amber beacons, operating 1/2 hour before dusk to 1/2 hour after dawn.

3.10.3 At the end of every work day, all excavated areas shall be securely barricaded.

3.10.4 If the contractor moves from one area of excavation to another, the work area with no workmen present shall be securely barricaded during the workday as well as after hours.

3.11 Blasting: Blasting will not be permitted.

3.12 As-Built Drawings: A marked up set of contract drawings shall be submitted by the contractor at the completion of each delivery order showing the new construction as well as any utilities uncovered/located during construction. Final payment for the delivery order will not be made until after receipt and approval of the as-built drawings.

3.13 Subsurface Information: Subsurface soil borings logs may be shown on the drawings. The sample of materials taken from subsurface investigations are not available. These data represent the best subsurface information available; however, variations may exist in the subsurface between boring locations.

3.14 Dust Barriers: The contractor shall maintain dust barriers at all times. Methods such as spraying shall be employed to prevent dust from being raised. Extra care shall be taken when working near buildings. Dust barriers must be placed over entrance doors to prevent any dust from entering buildings. If any dust penetrates building entrances, the contractor shall be totally responsible to clean all affected areas and return them to their original conditions.

3.15 Dewatering: The contractor shall employ all measures necessary for the dewatering of excavation. All excavations are to be kept free of water at all times.

SECTION 01011

SAFETY ENGINEERING AND MAINTENANCE

1.0 GENERAL:

1.1 Purpose: The purpose of this section is to provide the contractor with instructions for the safety engineering tasks.

1.2 Scope: The section identifies the safety requirements, technical constraints, and relationship with other contract tasks. No data will be delivered as a result of this section.

2.0 PRODUCTS: NOT USED

3.0 EXECUTION:

3.1 General Safety:

3.1.1 The contractor shall organize and maintain a safety program. The contractor's management organization shall include administrative, liaison, and technical functions to implement, direct, monitor, control, and allocate resources for these tasks and allied safety efforts within other tasks of the project. As a minimum, the safety tasks herein shall be accomplished by the contractor to assure that the safety requirements are satisfied.

3.1.2 The contractor shall document the approach used to satisfy safety requirements. The contractor's files containing safety and safety related data shall be available for review by the Government as deemed necessary by the Contracting Officer (CO).

3.1.3 The contractor shall be responsible for ensuring subcontractors provide necessary support to satisfy requirements. The contractor shall include a stipulation in all subcontracts to require subcontractors to comply with the safety provision specified herein.

3.1.4 The contractor shall comply with all applicable Air Force, command, and installation/facility mishap prevention requirements while operating through or at such an installation/facility.

3.2 System Safety:

3.2.1 The contractor shall ensure integration of system safety into the overall contractual effort which satisfies the requirements of MIL-STD-882.

3.3 Ground Safety:

3.3.1 Comply with applicable OSHA standards, federal, state and local laws, regulations and requirements regarding worker safety while performing work on the AFRL, Rome Research Site. Compliance shall include the following:

Comply with all safety and health requirements necessary for the protection of personnel, facilities and equipment including the following Air Force requirements for on-site contractors working side-by-side with government employees:

a. AFI91-202 w/AFMC Sup1- The US Air Force Mishap Prevention Program
b. AFI91-301 w/AFMC Sup 1- Air Force Occupational and Environmental Safety, Fire Protection and Health (AFOSH) Program
c. AFOSHSTD91-501 w/AFMC Sup1 - Air Force Consolidated Occupational Safety Standard
d. ADDITIONAL AFI and AFOSHSTD as required.

In the event of a mishap during the performance of this effort on AFRL RRS premise, notify the government in an expeditious manner. Notification shall include the following information:

a. Contract, Contract number, Name and Title of Person(s) Reporting
b. Date, Time and exact location of accident/incident
c. Brief Narrative of accident/incident (events leading to accident/incident)
d. Cause of accident/incident (if known)
e. Estimated cost of accident/incident (material and labor to replace/repair)
f. Nomenclature of equipment and personnel involved in accident/incident
g. Corrective Actions (taken or proposed)

For any information not available at the time of notification, provide follow-up information within twenty (20) calendar days.

3.3.2 The contractor shall develop and be prepared to implement procedures for evacuation and/or protection of people and facilities in the event of severe weather. These procedures will include provisions for securing or repositioning of equipment. The contractor shall notify the POC of any evacuation operations.

3.3.3 The contractor shall comply with OSHA requirements for all confined space entry.

3.4 Radiological Safety:

3.4.1. Nuclear Density Testers: contractor shall obtain written approval from the Contracting Office for all nuclear density testers planned to be used during construction. Contractor shall submit a letter with information requested below no less than 30 days prior to use of the nuclear

density testing equipment. The application from the contractor should include, at least, the following:

3.4.1.1 A description of proposed activities on NCR Form 241, Report Proposed Activities in Non-Agreement States, (the 180-day limitation on the form does not apply to organizations, holding an NRC license.) NCR Form 241 is available from AFRL/RIOCC.

3.4.1.2 The procedures established to ensure radiological health and safety of Air Force personnel and the public, the names and qualifications of individuals to conduct the activities and a copy of training certificates.

3.4.1.3 A copy of the applicable NRC or Agreement State license. Expired licenses are unacceptable.

3.4.1.4 The part of the Air Force contract describing work to be done and the inclusive dates of such work.

3.4.1.5 An acknowledgment that the Radiation Protection Officer will be authorized to periodically check the use of the radioactive material to ensure proper radiological health precautions are being followed. Any improper radiological procedures which the RPO discovers will be brought to the contractor's attention through the Contracting Officer's technical representative. Upon being notified of improper radiological procedures, the contractor will take corrective actions immediately to rectify the improper radiological procedures.

3.4.1.6 The contractor shall maintain a log of all nuclear density tester activity.

SECTION 01501

ENVIRONMENTAL PROTECTION

PART I - GENERAL

1.1 SCOPE: The work covered by this section consists of furnishing all labor, materials and equipment and performing all work required for the prevention of environmental pollution during and as the result of construction operations under this contract except for those measures set forth in other Technical Provisions of these specifications. For the purpose of this specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human life; affect other species of importance to man or degrade the ability of the environment for aesthetic and recreational purposes. The control of environmental pollution requires consideration of air, water and land, and involves noise, solid waste-management and management of radiant energy and radioactive materials, as well as other pollutants.

1.2 APPLICABLE REGULATIONS: In order to prevent, and to provide for abatement and control of, any environmental pollution arising from the construction activities of the contractor in the performance of this contract, they shall comply with all applicable Federal, State and local laws, and regulations concerning environmental pollution control and abatement.

1.3 NOTIFICATION: The Contracting Officer will notify the contractor in writing of any noncompliance with the foregoing provisions and the action to be taken. The contractor shall after receipt of such notice, immediately take corrective action. Such notice, when delivered to the contractor, shall be deemed sufficient for the purpose.

1.4 IMPLEMENTATION: Prior to commencement of the work the contractor will meet with representatives of the Contracting Officer to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.

SECTION 02000

TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.0 QUALITY ASSURANCE

A. Laboratory services are solely an assurance that contract provisions are met.

B. Forward copies of test results to the Government within ten days of testing.

PART 2 – NOT USED

PART 3 - EXECUTION

3.0 TESTING LABORATORY SERVICES

A. The contractor shall obtain the testing services of a laboratory that is regularly engaged in the testing of construction materials.

3.1 RESPONSIBILITIES AND DUTIES OF CONTRACTOR

A. To facilitate testing services, the contractor shall:

1. Furnish to the Laboratory such samples of materials as may be necessary for testing purposes.

2. Furnish such casual labor, equipment and facilities as is necessary to obtain and handle samples at the project.

3. Advise the Testing Agency sufficiently in advance of operations to allow for completion of tests and for the assignment of personnel.

4. Provide and maintain, for the sole use of the Testing Agency, adequate facilities for safe storage and proper curing of concrete test cylinders on the project site for the first 24 hours as required by ASTM C31.

5. Maintain records at the project site showing the date and extent of each concrete placement.

6. Provide safe access to items to be tested. This includes sheeting and ladders for deep excavation; scaffolding and ladders for inspection and testing of superstructure items.

B. If any portion of the work shows low test results, evidence of detrimental placing or curing conditions, the contractor may be required to do additional testing, compaction, cored samples or re-welding. In no case shall the inspector prescribe the method of repair of the defect.

3.2 QUALITY CONTROL

A. Testing Agency shall perform the following tests and inspections:

1. Select Fill and Compaction

a. Sieve analysis of proposed embankment, backfill, and sub-base material.

b. Optimum moisture maximum density curve for each soil used in accordance with ASTM D1557, Method A.

c. Tests of actual in-place density for each strata placed in accordance with ASTM D1556, D2167 or D2922.

2. Concrete

a. Tests of proposed aggregates for conformance with ASTM C33.

b. Compressive Strength Tests: ASTM C39. One set of 3 cylinders for each 50 cubic yards, or fraction thereof, placed in one day. One specimen tested at 7 days and 2 specimens tested at 28 days.

c. Slump Tests: ASTM C143-a. One test for each set of compressive strength test specimens.

d. Air Content Tests: ASTM C231-a. One for every other load at point of discharge, or when required by an indication of change.

e. Temperature: Note temperature of each load of concrete at point of discharge. Note air temperatures during placing period.

SECTION 02200

EXCAVATION, EMBANKMENT AND COMPACTION

PART 1 - GENERAL

1.0 RELATED WORK SPECIFIED ELSEWHERE

A. Trenching, Backfilling and Compacting: Section 02250

1.1 PROTECTION

A. The contractor shall use every precaution to prevent injury to the buildings, roads, curbs, walks, pipes, conduits, poles and structures above and below ground that are adjoining or included in the area under contract, and shall repair or replace any material or work damaged or destroyed by his forces or forces of his subcontractors.

B. The contractor shall maintain all bench marks, monuments and survey if reference points. If disturbed or destroyed, replacement shall be to the satisfaction of the Contracting Officer.

1.2 DEFINITIONS

A. Topsoil shall be considered the surface layer of soil suitable for use in seeding and planting. It shall contain no admixture of refuse or any substance toxic to plant growth and shall be free from subsoil, stumps, brush, roots, stones, clay lumps or similar objects larger than 1/4 inch in greatest dimension. The Contracting Officer shall determine the suitability of material for use as topsoil.

B. Sub-grade surface is defined as the surface of an embankment or excavation upon which sub-base or pavement courses are placed.

C. The sub-grade area is defined as the two (2) foot layer of earth immediately below the sub-grade surface, to a limit of one (1) foot outside the edges of pavement.

1.3 SUBMITTALS

Submit sieve analysis, optimum moisture, maximum density curve, and in-place density test results for fill material.

1.4 DESCRIPTION

The known structures, sewers and drains, manholes, pavements, side, walls, fences, hydrants, poles and similar structures located on, or adjacent to, the proposed work are shown on the drawings. Such information is shown for the convenience of the contractor but is not guaranteed to be complete or without error. The size and location of underground structures and utilities may be inaccurate and other obstructions may be encountered.

PART 2 - PRODUCTS

2.0 MATERIALS

A. Where embankment or fill is required for the construction of roads, parking areas, walks, lawns or appurtenances, material used shall be excavated or borrow material satisfactory to the Contracting Officer. Fill and embankment material shall be soil free from rubbish, deleterious, and unsuitable material of any kind, and of a nature that will compact into a solid and permanent fill.

B. The top size shall be (a) 6 inches or less if placed in a defined sub grade area or (b) 12 inches or less if placed in an embankment. Of the portion passing the four (4) inch sieve, 15 percent by weight or less shall pass the No. 200 sieve.

PART 3 - EXECUTION

3.0 EXCAVATION

A. The contractor shall perform all excavation which is required for the installation of all work under his contract, indicated on the drawings or called for by the specification. Excavation shall consist of the loosening, removing, loading, transporting, depositing and compacting of all materials (except material provided for under other items) of every name and nature, wet or dry, necessary for the preparation of sub-grades of pavements and walks, to grade the site to the elevations shown on the drawings, to excavate ditches, to construct earth foundations, to make embankments and fills, or for any other purposes necessary to complete the work of this contract. Surplus topsoil, if any, shall be disposed of off base.

B. All topsoil within the areas to be rough graded shall be stripped and stockpiled before the other excavation is commenced. The topsoil shall be stockpiled within the areas designated on the drawings or as directed by the Contracting Officer.

C. The stockpiles of topsoil shall be kept separate from all other classes of excavated and stockpiled material. Stockpiles shall be such size and shape as will keep loss of topsoil by wind and erosion to a minimum and shall be trimmed in a workmanlike manner to fairly uniform surfaces and slopes.

D. Unsuitable material shall be removed to the depth and limits designated by the Contracting Officer and disposed of off the site. The Contracting Officer shall be the sole judge of what constitutes unsuitable material.

E. Where old pavement, building foundations or walls are encountered within two (2) feet of sub-grade surface elevation, they shall be thoroughly broken up into 6 inch pieces and smaller, or else removed.

F. Where called for on the plans, the sub-grade area shall be excavated to remove stone over six (6) inches in diameter. The material may be used if otherwise suitable.

3.1 EMBANKMENTS AND FILLS

A. Fills and embankments shall be compacted to 90 percent Modified Proctor Density except as otherwise specified. Material for fill, unless otherwise specified, shall be as specified in Section 2.1.

1. TESTING Density determinations for soils shall be based on the Modified Proctor Density Test as determined by the latest revision of ASTM Designation 1557.

B. When embankments are to be constructed over ground that will not adequately support embankment construction equipment, an initial layer of fill may be allowed to form a working platform. The maximum thickness of the initial layer shall not exceed 2 feet.

C. When embankments are to be constructed on hillsides or against existing embankments with slopes steeper than 1 (vertical) on 3 (horizontal), the slopes shall be benched.

D. Topsoil under embankment areas, where finish grade is 6 feet or less above the existing grade, shall be stripped to its full depth.

E. Embankment and fill material shall not be placed on frozen earth, nor shall frozen soils be placed in any embankments.

F. Embankment material shall be placed and spread in lifts of uniform thickness not exceeding eight (8) inches in loose lift-thickness.

G. It shall be the contractor's responsibility to properly place and compact all materials and to correct any deficiencies resulting from insufficient or improper compaction. The contractor shall determine the type, size and weight of compactor best suited to the work; control the lift thickness; ensure that the applied effort (number of passes and travel speed) is uniformly applied; exert proper control over the moisture content of the material; and ensure other details necessary to obtain satisfactory results.

1. In areas inaccessible to conventional compactors, impact rammers, plate or small drum vibrators or pneumatic button head compaction equipment may be used with lift thickness not exceeding 6 inches. Hand tampers will not be permitted.

2. All fill material shall be at a moisture content for proper compaction of the material using the compactor selected. When water must be added to a material it may be added on the lift or in the excavation or borrow pit. Water added shall be thoroughly incorporated into the soil and manipulation shall be provided whenever necessary to attain uniformity of moisture distribution in the soil. When the moisture content of a lift about to be compacted exceeds the required amount, compaction shall be deferred until the layer has dried back to the required amount.

H. Damage to any compacted lift at any time during the course of construction, such as rutting under the loads imposed by earthmoving equipment, shall be fully repaired by the contractor prior to placement of any overlying materials.

3.2 ROUGH GRADING

A. The contractor shall perform the rough grading to the lines and grades shown on the plans or as modified by the Contracting Officer. Ridges and depressions shall be eliminated to the satisfaction of the Contracting Officer.

B. Sub-grade material under floor slabs, roads, parking areas and walks shall be compacted to 95 percent Modified Proctor Density Minimum. Other rough grade areas may be compacted to a minimum of 90 percent Modified Proctor Density unless otherwise shown on the drawings or directed by the Contracting Officer.

C. The contractor shall maintain slopes, crowns and ditches on all excavations and embankments to insure satisfactory drainage at all times.

D. The contractor shall exercise care not to over-excavate in the vicinity of structures, pavements and walks.

E. Spoil areas for surplus and waste materials, if required, must be furnished by the contractor unless permission to spoil on the Government's property is granted by the Government. All spoil areas on the Government's property shall be left in a neat and satisfactory condition. They shall be provided with permanent, suitable drainage and seeded, if required by the Government.

3.3 SUB-GRADE AREAS

A. Sub-grade for Pavements and Walks

1. Sub-grade for pavements and walks shall be accurately graded and shaped as shown on the drawings, or as directed by the Contracting Officer.

2. Sub-grade for walks shall be compacted by rolling or otherwise as the Contracting Officer may approve.

3. In case unsuitable material is encountered in the sub-grade, it shall be removed to the limits designated by the Contracting Officer and replaced with satisfactory materials.

4. All hollows and depressions which develop under rolling shall be filled with acceptable material and shall be rolled again. The process of rolling and filling shall be repeated until no depressions develop.

5. The sub-grade shall neither be muddy nor otherwise unsatisfactory when the sub-base or pavement material is placed upon it. If the sub-grade becomes rutted or displaced due-to any cause whatsoever, the contractor shall re-grade and compact same as specified without additional payment.

3.4 PREPARATION FOR TOPSOIL

A. After the surface has been rough graded, the contractor shall prepare the surface for placing topsoil within the limits called for in the contract as specified, or indicated on the drawings. The surfaces shall be graded to the specified or indicated depth below finished grade and in conformity with the drawings and these specifications. The areas shall be free from stone, roots, quack grass or other deleterious materials.

3.5 BORROW

A. The management of a borrow source and the acceptability of all borrow material shall be subject to the approval of the Contracting Officer at all times. The contractor shall provide certification that the material obtained for borrow meets the requirements of this section.

B. Testing

1. Field density tests may be ordered by the Contracting Officer at an average interval of one test for each 100 cy of in-place material and as directed by the Contracting Officer.

2. The contractor shall furnish all necessary samples for laboratory tests and shall provide assistance and cooperation during field tests. The contractor shall

plan his operations to allow adequate time for laboratory tests and to permit taking of field density tests during compaction. Any costs of retesting required as a result of failure to meet compaction requirements shall be borne by the contractor.

SECTION 02250

TRENCHING, BACKFILLING AND COMPACTING

PART 1 - GENERAL

1.0 DESCRIPTION

This section covers trenching, backfilling and compacting of excavations used for the installation of sub-drainage systems and drainage pipe, and for structures associated with these utilities.

1.1 CLASSIFICATION

Excavation - Shall comprise and include the satisfactory removal and disposition of all materials which are encountered within the required widths and depths of the excavations. Excavation shall be classified as follows:

A. Trench Excavation - shall include all earth, unsuitable material, loose rock and all concrete, masonry, pavement, piping, debris and all other materials.

B. Unstable Material Excavation - shall consist of the removal of all material meeting the definition of unstable material.

1.2 SUBMITTALS

Submit sieve analysis, optimum moisture, maximum density curve, and in-place density test results for select fill.

PART 2 - MATERIALS

2.0 DEFINITIONS

A. Earth: Clay, loam, sand, gravel, topsoil and other materials not classified as "solid rock" or "loose rock."

B. Select Earth: Previously excavated material free from clay, loam, organic material, debris, frozen material and containing only small amounts of stones, pebbles or lumps over 1 inch in greatest dimension, but none over 2 inches in greatest dimension.

C. Common Earth: Previously excavated material, consisting of clay, loam, sand, gravel, topsoil and similar material, free from debris and frozen materials, may contain some stones, pebbles, lumps and rock fragments up to 6 inches in largest dimension.

D. Unstable Material: Debris and material of any nature and all wet, soft or loose earth located below the bottom limits of excavation which does not provide sufficient bearing capacity to satisfactorily support pipes or other work placed thereon.

E. Select Fill: Well graded granular material or bank run gravel, free from silt, clay, and organic matter meeting the following gradation requirements:

Nominal Sieve Size	Amounts Finer than Size of Sieve (Percent by Weight)
4"	100
#40	0-70
#200	0-10

F. Pipe Bedding Material: As specified in specification for utility, or as shown on the drawings.

G. Sand shall conform to the general requirements for soil materials above and shall be clean, coarse grained material as classified by ASTM D 2487, of which no more than 10 percent by weight shall be finer than the No. 200 sieve.

H. Impervious Soil: Clay, loam, silt or other similar material, as approved by the Contracting Officer, having a permeability lower than the adjacent soil in trench excavation.

I. Unsuitable Material: Excavated material which does not meet specification requirements for backfill purposes and includes "unstable material."

J. Run of Bank Gravel: Clean, well graded granular material with all material passing a 2” Sieve Size.

K. Borrow Material: Borrow material shall be material which is approved by the Contracting Officer for backfill. The material may be previously excavated excess material which would normally be wasted or may be borrow material provided by the contractor. The contractor will not be required to provide gravel from borrow pits under this item.

PART 3 - EXECUTION

3.0 EXCAVATION – GENERAL

A. Non-Paved Areas: No trees or plantings shall be removed or trimmed without prior permission of the Contracting Officer. Small trees, plantings, etc., shall be carefully taken up and preserved for reuse by an approved landscape subcontractor. Topsoil shall be removed for its full depth and shall be stockpiled separately from other excavated materials and preserved for reuse.

B. Paved Areas, Walks and Curbs: All paved areas, walks and curbs are to be restored. The existing pavements shall be cut to the limits indicated or, if not indicated, to the minimum extent required for proper installation of the pipe lines and appurtenances. An approved type cutting tool which will cut a neat, straight joint line shall be used to cut pavement surface along the limits of removal. The contractor shall replace the disturbed pavements with new pavement equivalent or superior to the existing in quality, thickness and surface finish, and in accordance with the requirements.

C. Drainage and Dewatering of Excavations

1. The contractor shall, during construction, conduct his operations so as to prevent at all times the accumulation of water, ice and snow in excavations or in the vicinity of excavated areas so as to prevent water from interfering with the progress or quality of the work. Under no conditions shall water be allowed to rise in un-backfilled trenches after pipe has been placed.

2. Accumulated water, ice and snow shall be promptly removed and disposed of by dewatering. Disposal shall be carried out in a manner which will not create a hazard to public health, nor cause injury to: Public or private property, work completed or in progress, public streets, nor cause any interference in the use of streets and roads by the public. Pipes under construction shall not be used for drainage of excavations unless approved by the Contracting Officer.

3. During construction, when an unstable condition in the pipe sub-grade has been created due to the contractor's excavation, the sub-grade shall be stabilized by dewatering or other means approved by the Contracting Officer.

D. Sheeting and Bracing

1. Sheeting and bracing for all excavation work shall be provided and maintained as required for safety and in accordance with local, State and Federal laws. All material used for sheeting and bracing shall be sound and free from defects which might impair its strength and effectiveness. The requirements of the Industrial

code shall be considered as part of these specifications.

2. The Contracting Officer may order sheeting and bracing to be left in place and cut off where directed. Where, in the opinion of the contractor, damage may result from withdrawing sheeting, he shall immediately notify the Contracting Officer and verify same in writing as soon as practicable.

3. The contractor shall be responsible for the adequacy of all sheeting and bracing used and for all damage to persons or property resulting from improper quality, strength, placing, maintenance and removal.

4. All excavations near existing utility lines shall be braced or sheeted as required in order to protect the existing utility. It shall be the responsibility of the contractor to prevent damage to or displacement of utilities, and to work with and request the concurrence of the utility company's representative in this matter.

E. Disposal of Excavated Materials

1. Excavated materials meeting specification requirements may be used as backfill for trenches and other excavations, and shall be stored in an orderly manner at a sufficient distance from the banks of excavations to avoid overloading and to prevent slides or cave-ins. Excess excavated material shall be promptly disposed off the site by the contractor.

2. "Unsuitable material" shall be loaded directly from the excavation and removed from the backfilling area. The contractor shall remove and dispose of all "unsuitable material" from the construction site within 48 hours after excavation, unless otherwise directed by the Contracting Officer.

3. Stored or piled materials shall not obstruct roads, driveways, sidewalks, or interfere with drainage along gutters, ditches or drainage channels. If any excavated material cannot be stored at the site in a manner to avoid such obstructions or interferences, it shall be stored away from the site at a location approved by the Contracting Officer. As much of this material which is necessary for the purpose, and is of satisfactory quality, shall be brought back for subsequent use as backfill at no additional cost to the Government.

4. Disposal of excavated materials in the beds of live or intermittent drainage channels will not be permitted under any circumstances. Re-channelization of streams or drainage channels resulting in the direction of flow against banks not protected with a substantial growth of vegetation will not be permitted unless the contractor provides approved protection material on such banks. Stream crossings by construction vehicles shall be kept to a minimum and shall not result in disruption of the flow in the natural stream or channel or in exposure of raw soil along the banks. Any sediment deposited in the beds of streams or drainage

channels as a result of the contractor's operations shall be removed in an approved manner. Any damage to existing stream or channel beds and banks and any disruptions to flow shall be repaired and restored as approved by the Contracting Officer and at no additional cost to the Government.

3.1 TRENCHING FOR PIPE LINES

A. Length of Open Trench: The length of trench to be opened at one time shall not be longer than 200 feet in advance of the completed work, nor more than 100 feet in the rear thereof. The excavation of the trench shall be fully completed at least 20 feet in advance of the pipe laying.

B. Depth of Trench: Trenches shall be completely excavated to the sub-grade elevation shown on the drawings.

C. Widths of Trenches: Trenches shall be excavated normally within the widths indicated on the drawings. The sides of trenches shall be as nearly vertical as practicable to the height indicated in the drawings. If the indicated trench widths are exceeded, then concrete cradles, or other special installation procedures, may be required and shall be provided.

3.2 UNSTABLE MATERIAL

Whenever the pipe or structure sub-grade material is incapable of supporting the utility or structure and classified "unstable material" as determined by the Contracting Officer, he will indicate the extent to which the "unstable material" shall be removed, and also select the material for refilling and compacting to the proper grade.

3.3 PIPE BEDDING

A. Pipe Bedding, except as otherwise specified or directed, all pipe shall be installed in Pipe Bedding as shown on the drawings.

1. Bedding Material - shall be approved imported "bedding material."

2. Installation - Bedding shall only be installed on approved sub-grades and shall be thoroughly compacted in layers not over 4 inches thick. It shall be installed and carefully shaped to fit the lower part of the pipe to the dimensions shown on the drawings.

3.4 BURIED WARNING AND IDENTIFICATION TAPE

Shall be plastic (PVC) tape manufactured specifically for warning and identification of buried utility lines. Tape shall be provided in rolls, 6-inch minimum width, color coded for intended service with warning and identification imprinted in bold black letters continuously and

repeatedly over entire tape length. Warning and identification shall be “CAUTION BURIED (Intended Service) LINE BELOW” or similar wording. Code and letter coloring shall be permanent, unaffected by moisture and other substances contained in trench backfill material.

3.4 EXCAVATION FOR STRUCTURES

A. General: Excavations for manholes and other structures and appurtenances shall be of sufficient size for the proper installation of the structure, including sheeting and bracing if required, and to permit inspection of the work. Care shall be taken to provide an undisturbed sub-grade. If necessary, the sub-grade shall be trimmed by hand to insure that an undisturbed foundation is provided.

B. Sub-grades: Sub-grades shall be compacted and inspected by the Contracting Officer's Technical Representative before foundation concrete is placed.

3.5 BACKFILLING

A. General: Unless otherwise directed, trenches and excavations shall be backfilled as soon as possible after pipes are laid, structures built, and the work inspected, tested as required and accepted, and when permission to backfill has been given by the Contracting Officer’s Technical Representative. Immediately prior to backfilling, all rubbish, debris, forms, etc., shall be removed from the excavations. Backfilling shall not be done with frozen materials nor when materials already placed are frozen.

B. Backfill Material

1. Source - To the extent it is available, backfill shall consist of excavated material approved for backfilling by the Contracting Officer. Where excavation does not provide sufficient approved material, the contractor shall import “borrow material" as directed by the Contracting Officer.

2. Select Fill - Except as otherwise specified, backfill along sides and over pipes shall be "select fill" to a depth of 1 foot above the top of the pipe.

3. Paved Areas - In paved areas, remainder of backfill over "select fill" shall be as ordered by the Contracting Officer or as shown on the plans.

4. All Other Areas - In other areas, remainder of backfill over "select fill" may be "common earth."

C. Placing Backfill

1. Select Fill - "Select fill" shall be placed in 6 inch layers and thoroughly and carefully compacted. Backfill shall be brought up evenly on both sides of the pipe and care shall be taken to insure compaction under the haunches of the pipe.

2. Paved Areas - The entire depth of trenches under paved areas it shall be backfilled and compacted in 6 inch layers.

3. All Other Areas - backfill of "common earth" shall be placed and compacted in 12 inch maximum layers.

D. Backfill at Structures: Backfill shall not be placed against holes and structures until the approval of the Contracting Officer has been obtained. Concrete shall have been in place for at least seven (7) days. Mortar joints and exterior plaster coating of masonry structures shall be thoroughly set and shall have been in place at least three (3) days and damp proofed surfaces properly cured. Backfill shall be deposited in horizontal layers, not over 6 inches in compacted thickness, uniformly spread and compacted to the specified density. Special precautions shall be taken to prevent wedging action against the walls of structure.

E. Top of Backfill: In paved areas, backfill shall be carried up to pavement sub-grade ready to receive pavement foundation material. In other areas, backfill shall be brought up to adjacent finished grade minus the depth of any required topsoil and so as to provide a finished surface slightly mounded over trench. Any trenches improperly backfilled or where settlement occurs shall be reopened to the depth required for proper compaction and shall then be refilled and compacted with the surface restored to required grade and degree of compaction, mounded over and smoothed off.

3.6 COMPACTION

A. General: Compaction densities specified herein shall be the percentage of the maximum density obtainable at optimum moisture content as determined and controlled in accordance with ASTM Standard D1557. Field density tests shall be made using the sand cone method. Each layer of backfill shall be moistened or dried, as required, and shall be compacted to the following densities unless otherwise specified in the project specifications.

1. "Select Fill"; under paved areas 95% if gravel having a minimum of 30% retained on 3/4 inch sieve is used, otherwise 100%. All other areas95%

B. Methods and Equipment: Methods and equipment proposed for compaction shall be subject to the prior approval of the Contracting Officer. In compacting by rolling or operating heavy equipment over the pipe lines, displacement of or injury to the pipe and structures shall be avoided. Movement of in-place pipe or structures shall be at the contractor's risk. Any pipe or structure damaged thereby shall be replaced or repaired as directed by the Contracting Officer.

C. Testing

1. Field density tests may be ordered by the Contracting Officer for each foot of depth of backfill at an average interval of 100 feet along the trench and at other locations as directed by the Contracting Officer.

2. The contractor shall furnish all necessary samples for laboratory tests and shall provide assistance and cooperation during field tests. The contractor shall plan his operations to allow adequate time for laboratory tests and to permit taking of field density tests during compaction. Any costs of retesting required as a result of failure to meet compaction requirements shall be borne by the contractor.

SECTION 02251

SOIL STERILIZATION

1.0 DESCRIPTION OF WORK

This specification covers soil sterilization. Products shall be as directed. Installation procedures shall be in accordance with the product manufacturer's recommendations.

2.0 PRODUCTS:

2.1 Weed Eradication and Soil Fumigation: Products approved by the Environmental Protection Agency.

2.2 Liquid and Dry Herbicides

2.2.1 Bare Ground Herbicides: Bromacil powder mixture or an ammonium sulfanate spray.

2.2.2 Contact Weed Killers: Roundup or equal.

2.2.3 Wetting Agents: As required.

2.3 Equipment: Equipment shall be appropriate to the application and approved before use by the Contracting Officer’s Technical Representative.

3.0 EXECUTION:

3.1 Soil: After the sub-grade has been prepared, all areas to be surfaced shall be treated with a weed eradicator and soil fumigant only in the designated areas.

3.2 Wetting Agents may be used as an additive to improve the performance of weed and brush herbicides.

SECTION 02275

SUBDRAINAGE SYSTEMS

PART 1 - GENERAL

1.0 RELATED WORK SPECIFIED ELSEWHERE

A. Trenching, Backfilling and Compacting: Section 02250

B. Drainage Structures: Section 02275

C. Drainage Pipe: Section 02700

1.1 SUBMITTALS

Manufacturer's descriptive literature and recommended method of installation for all products used.

1.2 PRODUCT HANDLING

Materials shall be protected during transportation and storage to avoid physical damage.

PART 2 - PRODUCTS

2.0 PERFORATED UNDERDRAINS

A. Perforated Corrugated Galvanized Steel Pipe, AASHTO Designation M36 for Type III.

a. The average tensile strength and elongation at rupture shall be not less than 6000 psi and 5 percent respectively when tested in accordance with ASTM D638.

b. The minimum crushing strength of pipe and fittings shall be 1200 pounds per linear foot when tested in accordance with ASTM C4.

c. The average decrease in inside diameter of pipe and fittings shall not exceed 10 percent when subjected to a load of 55 pounds per foot.

2.1 FILTER MATERIAL

A. Filter material shall be No. 1 crushed stone, washed free of fines, as defined in the standard specifications of the New York State Department of Transportation, 2008. Crushed stone shall meet the following sieve analysis:

100 Percent Passing	1 Inch
90-100 Percent Passing	1/2 Inch
0-15 Percent Passing	1/4 Inch

2.2 FILTER FABRIC

A. Filter fabric shall be designed for use in a subsurface drainage system and shall be one of the following materials or as approved:

1. Mirafi 140N or 140S as supplied by Celanese Fibers Marketing Co., 1211 Avenue of the Americas, New York, New York 10036.

2. Typar-Style 3341 as supplied by DuPont Company, Textile Fibers Department, Wilmington, Delaware 19890.

PART 3 - EXECUTION

3.0 INSTALLATION

A. Pipe

1. Pipe shall be installed to line and grades as shown on the plans.
2. Place perforations downward unless indicated on the drawings.
3. Complete joints in accordance with manufacturer's instructions.

B. Filter Material

1. The filter material shall be placed around the pipe to the widths and depths as shown on the drawings.

2. The filter bed and the layer over the under-drain pipe shall be thoroughly tamped, being careful not to disturb the pipe alignment.

C. Filter Fabric

1. Place fabric as shown on the drawings. Ends of rolls shall be overlapped a minimum of 2 feet.

2. Fabric shall be placed to provide a complete envelop with a minimum overlap on top of 1 foot 6 inches.

3. Filter fabrics which are subject to deterioration by ultra violet rays shall be protected from sunlight during transport and storage.

SECTION 02300

TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL

1.0 DESCRIPTION

This work shall consist of temporary control measures as shown on the plans during the life of the contract to control soil erosion and water pollution, through the use of berms, dikes, dams, sediment basins, fiber mats, netting, gravel, mulches, grasses, slope drains and other erosion control devices or methods. The temporary control provisions contained herein shall be coordinated with the permanent erosion control features specified elsewhere in the contract to the extent practical to assure economical, effective and continuous erosion control throughout the construction and post construction period. Work under this specification will not be used and paid for in situations where permanent contract items in the final position in the contract can be practically installed and can provide the necessary control measures.

2.0 MATERIALS

Materials required for this work shall include the following:

2.2.1 Mulches. Mulches may be hay, straw, fiber mats, netting, wood cellulose, corn or tobacco stalks, bark, corn cobs, wood chips or other suitable material acceptable to the Contracting Office's Technical Representative and reasonably clean and free of noxious weeds and deleterious materials.

2.2.2 Slope Drains. Slope drains may be constructed of pipe, fiber mats, rubble, Portland cement concrete, bituminous concrete, plastic sheets or other material acceptable to the Contracting Officer's Technical Representative and adequate for erosion control.

2.2.3 Grass. Grass shall be a quick growing species (such as ryegrass, Italian ryegrass, or cereal grasses) suitable to the area and as a temporary cover, which will not compete with the grasses sown later for permanent cover.

2.2.4 Fertilizer. Fertilizer and soil conditioners shall be a standard commercial grade acceptable to the Contracting Officer.

3.0 CONSTRUCTION DETAILS

3.1 General. In the event of conflict between these specification requirements and pollution control are laws, rules or regulations of other Federal or State or local agencies, the more restrictive laws, rules or regulations shall apply.

3.1.1 Authority of Work. The Contracting Office has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, the surface area of erodible earth material exposed by excavation, borrow and fill operations and to direct the contractor to provide

immediate permanent or temporary pollution control measures to minimize damage to adjacent property and to minimize contamination of adjacent streams or other watercourses, lakes, ponds or other areas of water impoundment.

3.1.2 Areas of Work. The Contracting Officer’s Technical Representative will limit the area of clearing and grubbing, excavation, borrow and embankment operations in progress, commensurate with the contractor's capability and progress in keeping the finish grading, mulching, seeding and other such permanent control measures current in accordance with the accepted schedule. Should seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified.

SECTION 02400

SUB-BASE COURSE

PART 1 - GENERAL

1.0 DESCRIPTION

A. Under this item, the contractor shall furnish, place and compact a granular material sub-base course of gravel, sand, blast furnace slag, stone, stone screenings or other acceptable blend or mixture in locations and to the depths and limits as shown on the drawings, as required, or as ordered by the Contracting Officer.

1.1 SUBMITTALS

A. Submit sieve analysis and certification that sub-base course material meets the requirements of PART 2. Provide optimum moisture, maximum density curve, and in-place density test results in accordance with Section 02000.

PART 2 - MATERIALS

2.0 SUB-BASE COURSE MATERIAL

A. NYSDOT T, Type 4 sub-base course having the following gradation:

Size	Passing by weight
2"	100
1/4"	30-65
No. 40	5-40
#200	0-10

B. The result of multiplying the percentage passing the No. 200 sieve by the Plasticity Index of the particles passing the No. 40 sieve shall not exceed 30. The Plasticity Index shall not exceed 5.0. Of the particles retained on the 1/2 inch sieve, not more than 30 percent by weight shall consist of flat or elongated pieces. A flat or elongated piece is defined herein, as one, the greatest dimension of which is more than 3 times the least dimension.

C. As determined by the Magnesium Sulphate Soundness Test (AASHTO T104), the maximum percent loss at 4 cycles by weight shall be 20.

2.1 SOURCE OF MATERIAL

A. The source of material shall be stripped back of all sod, topsoil, overburden and other objectionable material for a minimum of 30 feet from the top of the working face at all times.

PART 3 - EXECUTION

3.0 PLACING

A. The spreading of material shall be done in such a manner as to minimize segregation of sizes - that is, to place the full lift thickness without feathering. The minimum compacted thickness of placed sub-base material shall be 4 inches.

3.1 COMPACTION

A. It shall be the contractor's responsibility to properly compact all materials and to correct any deficiencies resulting from insufficient or improper compaction. The contractor shall determine the type, size and weight of compactor best suited to the work; control the lift thickness; ensure that the applied effort (number of passes and travel speed) is uniformly applied; exert proper control over the moisture content of the material; and ensure other details necessary to obtain satisfactory results.

1. In Areas Inaccessible to Road Type Compactors: impact rammers, plate or small drum vibrators or pneumatic button head compaction equipment may be used with lift thickness not exceeding 6 inches. Hand tampers will not be permitted.

2. All sub-base material shall be at a moisture content for proper compaction. Water added shall be thoroughly incorporated into the soil and manipulation shall be provided whenever necessary to attain uniformity of moisture distribution. When the moisture content of a lift about to be compacted exceeds the optimum range, compaction shall be deferred until the layer has dried back.

3. Sub-base shall be compacted to 95 percent Modified Proctor Density.

4. Compaction shall not be allowed to lag the placing operation by more than 200 feet.

3.2 TRAFFIC AND CONTAMINATION

A. No roadway or construction equipment traffic shall be permitted over the final finished sub-base course surface except as necessary for the construction of overlying course at that location. Prior to final finishing of the course, however, traffic over the course may be permitted at locations designated by and under such restrictions as may be

imposed by the Contracting Officer. In locations where permission is given to route construction equipment over the sub-base course, the contractor shall place the course to not less than 2 inches above the design sub-base course grade, to form a temporary protective layer. After traffic in these locations has been terminated, the protective layer shall be removed and the surface of the course fine-graded to the proper grade as specified in paragraph 3.3.

B. Contamination of the sub-base course with any deleterious material, such as silt, clay, mud or organic material, through any cause whatsoever, shall be corrected by the contractor by excavation and replacement of the sub-base material in the affected areas.

3.3 FINE GRADE TOLERANCE

A. The final surface of the sub-base course shall be fine graded so that, after final compaction and just prior to placement of base or pavement courses, the surface elevation shall not vary more than 1/4 inch above or below the design line and grade at any location. The surface shall be completed to the above tolerance and approved by the Contracting Officer's Technical Representative prior to any work at a given location to place an overlying course. If, after approval, the course becomes displaced or disturbed in any way for any reason, the contractor shall repair and re-grade the damage to the satisfaction of the Contracting Officer's Technical Representative prior to placing the overlying course.

B. Testing

1. Field density tests may be ordered by the Contracting Officer at an average interval of one test for each 100 cubic yards of in-place material and as directed by the Contracting Officer's Technical Representative.

2. The contractor shall furnish all necessary samples for laboratory tests and shall provide assistance and cooperation during field tests. The contractor shall plan his operations to allow adequate time for laboratory tests and to permit taking of field density tests during compaction. Any costs of retesting required as a result of failure to meet compaction requirements shall be borne by the contractor.

3. Testing shall be in accordance with Section 02000.

SECTION 02480

LANDSCAPE PLANTINGS & TURF ESTABLISHMENT

1.0 SCOPE

The contractor shall provide all plants, grass seed, labor, equipment and supplies needed to establish turf, and to install, according to industry standards, the trees and shrubs specified in the plant list.

2.0 MATERIAL REQUIREMENTS

Prolawn Practice Field mix or equivalent grass seed shall be used for grass seeding, and shall be applied at a rate of 8 pounds per 1000 square feet. All areas to be seeded shall be prepared for seeding by spreading a layer of ground agricultural limestone and fertilizer evenly over the area. The fertilizer shall be as specified below and the application rates shall be as specified on the contract drawings. All areas to be seeded shall be hydro-seeded according to industry standards or hand-seeded and mulched with straw. All plant materials shall be nursery grown, balled and burlapped (B&B), conform to the varieties and sizes specified, and shall be true to botanical names.

3.0 PLANTING DETAILS

Trees and shrubs shall be planted according to generally acceptable industry standards. Soil for backfilling planting holes shall be amended with peat moss in a ratio of 2 parts soil, one part peat moss. Plants shall be fertilized with tablet form, slow release fertilizer containing at minimum 5% nitrogen, 10% phosphorus and 5% potash, in accordance with the manufacturer's recommended application rate. Trees shall be staked and guyed according to acceptable industry standards. Trees and shrubs, after planting and watering shall be mulched, with a minimum of 3 inches of wood bark or shredded wood mulch applied to the planting saucer. Dead or damaged branches will be pruned.

4.0 WARRANTY

Trees and shrubs shall be guaranteed for one year after final acceptance. All plants that are found to be diseased, dying or dead during the guarantee period shall be removed and replaced with a plant of like species and size, by the contractor at no cost to the government. Grass shall grow and thrive. The contractor shall maintain the planted grass seed until it grows to a minimum height of four inches and is mowed for the initial mowing by the contractor. Bare spots shall be re-seeded and similarly warranted.

SECTION 02481

TOPSOIL

1.0 SCOPE

This specification covers material requirements for topsoil use in seeding, sodding or planting.

2.0 MATERIAL REQUIREMENTS

A. Topsoil shall be the surface layer of soil and shall be free from refuse, any material toxic to plant growth, subsoil, woody vegetation, and stumps, roots, brush, stones, clay lumps or similar objects larger than 1/2 inch in greatest dimension. Sod and herbaceous growth such as grass and weeds not be removed but shall be thoroughly broken up and mixed with the soil during handling operations.

B. Topsoil shall meet the following requirements unless otherwise specifically stated in the contract documents or drawings:

1. The pH of the material shall be between 5.5 and 7.6.

2. The organic content shall be not less than 3 nor more than 20%.

3. Gradation:

Sieve Size	Percent Passing by Weight
1/2 inch	100
3/8 inch	85 to 100
1/4 inch	65 to 100
No. 200 mesh	20 to 80

C. The contractor may amend natural topsoil with approved materials and by approved methods to meet the above specifications.

3.0 STOCKPILING AND SAMPLING

See NYSDOT "Standard Specifications"

4.0 TESTING

See NYSDOT "Standard Specifications"

5.0 BASIS OF ACCEPTANCE

See NYSDOT "Standard Specifications"

SECTION 02576

CRACK SEALING OF ASPHALT CONCRETE PAVEMENTS

1.0 DESCRIPTION OF WORK

This specification covers the furnishing and installation of materials for crack sealing of asphalt concrete pavements. Products shall match existing materials. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

2.0 PRODUCTS:

2.1 Liquid Asphalt shall comply with ASTM D 2027, Grade MC-250.

2.2 Emulsified Asphalt shall comply with ASTM D 977, Grade MS-2.

2.3 Sealing Compound shall comply with Fed. Spec. SS-S-1401.

2.4 Fine Aggregate shall be natural sand or crusher dust and have a maximum size of not more than 1/8 inch and be free of clay or organic matter.

3.0 EXECUTION:

3.1 Preparation:

3.1.1 All Cracks to be sealed shall be cleaned of dirt and debris.

3.1.2 Crack Cleaning Equipment shall consist of a portable air compressor with hose and nozzles for directing air directly into cracks and stiff bristle brooms.

3.1.3 Heating Equipment for Liquid Asphalt shall be mobile and shall be equipped with an agitating device for stirring material during heating, a thermometer, regulating equipment for heat control, and a gravity-type draw off valve.

3.1.4 Heating Equipment for Sealing Compound: Unless otherwise required by the manufacturer's recommendations, the equipment shall be mobile and shall consist of double boiler, agitator-type kettles with oil medium in the outer space for heat transfer. The applicator unit shall be so designed that the sealant will circulate through the delivery hose and return to the inner kettle when not sealing cracks.

3.1.5 Application Equipment shall have a spout or nozzle of such size that the sealing material will be placed in the cracks without entrapping air in cracks or spreading material on adjacent pavement surface.

3.2 Installation:

3.2.1 Sealing Compound: All cracks 1/8 inch wide and wider shall be sealed. The application temperature for sealing compound shall comply with Fed. Spec. SS-S-1401, Cracks 1/2 inch wide and wider shall be filled with a slurry of fine sand and an emulsified asphalt or liquid asphalt After the slurry has cured, cracks shall be sealed with liquid asphalt or emulsified asphalt and lightly sanded.

3.2.2 Liquid and Emulsified Asphalt Sealer: The temperature shall be varied so that it flows freely into cracks and completely fills cracks without entrapping air. Cracks shall be free of moisture before filling and shall be filled slightly above the pavement surface. When excess sealer has been removed, the sealer shall be covered with fine sand.

3.2.3 Traffic Control: Traffic will not be permitted over sealed cracks until the sealer has cooled so that it is not picked up by vehicle tires. The contractor will be responsible for all barricades and flagmen necessary to control traffic.

SECTION 02577

PATCHING OF ASPHALT CONCRETE PAVEMENTS

1.0 DESCRIPTION OF WORK

This specification covers the furnishing and installation of materials for patching of asphalt concrete pavements. Products shall match existing materials or shall be as directed by the Contracting Officer. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

2.0 PRODUCTS:

2.1 Asphaltic Concrete:

2.1.1 Hot-Mixed, Hot-Mixed Asphaltic Concrete and Emulsified Asphalt shall comply with requirements of ASTM D 3515.

2.1.2 Plant-Mixed, Stockpiled Asphalt Cold Mixes shall comply with the requirements of Asphalt Institute Specification PM-2.

2.2 Bituminous Prime: Bituminous prime shall comply with ASTM D 2027.

2.3 Base Course: Base course material shall comply with New York State Department of Transportation specifications for dense-graded, high-quality material meeting the requirements of Section 304, Type 2 Sub-base Course.

2.4 Bituminous Tack Coat: Bituminous tack coat shall comply with ASTM D 2027.

3.0 EXECUTION:

3.1 Preparation of Areas for Patching:

3.1.1 Pot Holes: Trim the perimeter of each hole to a vertical face and back to well compacted material. Remove material to a depth that provides a uniform well compacted bottom surface. Remove all loose material resulting from trimming or otherwise existing in the hole. Areas to be repaired are to be dry before repair is started.

3.1.2 Alligator Cracked and Rutted Areas: The pavement shall be sawed or cut with pavement breakers to a smooth vertical face 1 foot outside of the alligator cracked areas. Unsatisfactory material shall be removed in a manner not to disturb the sides of the excavated area.

3.1.3 Slippage Areas: Saw a rectangular area around the slippage area that overlaps into the well bonded material by at least 1 foot. The depth of the saw cut shall be equal to the thickness of the layer of material that is slipping. The surface where slipping is occurring shall be broom cleaned and all loose material removed.

3.2 Installation:

3.2.1 Application Temperatures: Application temperatures for all asphalt material shall comply with provisions of the Asphalt Institute Publications and the applicable ASTM.

3.2.2 Base Course: Place base course material in layers not exceeding a compacted thickness of 6 inches. After placing, compact each layer by mechanical compactors to a density of not less than the density of the corresponding layer of the adjacent pavement structure and not less than 95 percent of Modified Proctor Maximum Density.

3.2.3 Prime Coat: Prime base course with MC-70 liquid asphalt at a rate of 0.20 to 0.30 gallon per sq. yd. Blot excess prime with sand before the surfacing material is applied.

3.2.4 Tack Coat: Give the edges of existing asphaltic concrete or surfaces of portland cement concrete and asphaltic concrete a tack coat of MC-70 liquid asphalt at a rate of 0.05 to 0.15 gallon per sq. yd. Allow the material to cure before placing the surfacing material.

3.2.5 Hot-Mixed Asphaltic Concrete: Place the material in layers not exceeding 2-1/2 inches in thickness and compact to a density equal to the density of the adjacent asphaltic concrete.

3.2.6 Stockpiled Cold Mixes: The compacted thickness of each layer of material shall not exceed 2 inches. Before compaction, the material shall be allowed to aerate, if necessary, until the proper amount of cohesion has developed to obtain adequate compaction. When more than one layer is used, each layer shall be thoroughly cured before the succeeding layer is placed.

3.2.7 Cut Edges: All cut edges shall have a final sealer around the entire perimeter of the patch.

SECTION 02578

BITUMINOUS SURFACE TREATMENT

PART 1 - GENERAL

1.0 DESCRIPTION

A. Under this item the contractor shall construct or resurface the following bituminous surface courses conforming to the grades, section, and limits as shown on the plans. Materials and methods shall conform to the Standard Specification of the New York State Department of Transportation, Design and Construction Division, May 1, 2008.

1.1 RELATED WORK SPECIFIED ELSEWHERE

Sub-base Course: Section 02400.

1.2 SUBMITTALS

Provide manufacturer's certification that materials conform with these specifications.

PART 2 - PRODUCTS

2.0 AGGREGATES

A. The aggregates for surface treatments shall be crushed stone, crushed gravel, or crushed slag meeting the requirements of 703-02, Course Aggregates. In addition, any aggregate used for surface treatments on pavement shall not contain more than 5 percent chert. The required aggregates sizes for the various bituminous surface treatments are given herein.

B. Bituminous Surface Treatment - Double Course for Pavement.

1. The aggregate size for the first course shall be No. 1 and the second course shall contain aggregate size No. 1A.

2.1 BITUMINOUS MATERIAL

A. The bituminous material required for the surface treatment course shall meet the requirements of 702, Bituminous Materials. The type and grade of bituminous material shall be as stated in 2.2, Application Quantities.

2.2 APPLICATION QUANTITIES

A. The following table specifies application quantities for a double course bituminous pavement.

Size of Course Aggregate	Quantity of Aggregate (lb./Square Yard)	Quantity of Asphalt (gal/Square Yard)	Type and Grade of Asphalt
No. 1	40	0.4	MS-2
No. 1A	25	0.6	RS-2

PART 3 - EXECUTION

3.0 GENERAL

A. Bituminous material shall be applied in accordance with NYSDOT specifications and shall never be applied on a wet surface, a frozen surface, or when the air temperature is below 50 degrees F or above 95 degrees F in the shade, unless otherwise indicated.

B. Prepare existing gravel base surface by repairing unsuitable areas to the satisfaction of the Contracting Officers' Technical Representative and scarifying in-place material. Remove rocks larger than 2 inches in dimension. Re-grade as required to elevations indicated on plans. Sub-base material, as specified in Section 02400, shall be used for existing gravel base repairs and in areas requiring fill material to bring base up to proper elevations. Fine grade and compact in accordance with Section 02400.

C. Areas scheduled to receive bituminous surface treatment shall be free of debris and ponding water. After existing surface has been prepared, the first course of the bituminous surface treatment shall be applied. Once the first application has cured, the surface shall be leveled with a drag broom to provide a surface free of voids and depressions. The second course shall be applied thereafter. Application quantities for both courses will be given.

D. Application of bituminous surface treatments shall be applied as to eliminate transverse and longitudinal joints.

E. The second and final course of bituminous surface treatment shall be rolled with a pneumatic tired roller.

SECTION 02583

RECLAIMED ASPHALT CONCRETE INTERMEDIATE AND WEARING COURSES

PART 1 GENERAL

1.0 DESCRIPTION OF WORK

This specification covers the furnishing and installation of materials for central plant hot mix reclaimed asphaltic concrete for intermediate and wearing courses for asphalt concrete pavements. Products shall match existing materials. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work. It is the intent of this specification to use reclaimed asphalt pavement in accordance with the Standard Specifications of the New York State Department of Transportation, Design and Construction Division, May 1, 2008, Section 703-09, Reclaimed Asphalt Pavement.

SECTION 02585

PAVEMENT REINFORCING FABRIC

1.0 DESCRIPTION OF WORK

This specification covers the furnishing and installation of materials for nonwoven polypropylene pavement reinforcing fabrics installed prior to overlaying pavements with asphaltic concrete. Products shall match existing materials or shall be as directed by the Contracting Officer. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.1 REFERENCED SPECIFICATIONS AND STANDARDS

The following specifications and standards of the assures listed below (including amendments), but referred to thereafter by basic designation only, form a part of the specification to the extent required by the reference thereto:

1.1.1 American Society For Testing and Materials Standard Specifications:

D-1682	Grab Tensile Strength
D-3876	Mullen Bust Test

2.0 MATERIALS:

2.1 Sampling and Testing: A Manufacturer's Certificate of Compliance to the specifications, catalog cuts and a sample for approval or testing shall be submitted to the Contracting Officer.

2.2 The requirements for bituminous material for tack coating shall be in accordance with NYSDOT "Standard Specifications"- Section 407.

2.3 The requirements for the reinforcing fabric shall be a needle punched, nonwoven, polypropylene fabric having the following minimum properties:

	Maximum	Minimum	
Grab Tensile Strength, Pounds:	-	120	
Elongation at break, %1:	110	50	
Mullen Burst Strength, psi2:	-		300

ASTM D-1682
ASTM D-3786

3.0 EQUIPMENT:

3.1 Asphalt Distributor: The distributor must be suitably metered and capable of spraying the asphalt sealant at a prescribed uniform application rate. No drilling or skipping should be permitted. The Contracting Officer will require satisfactory test applications at an off-site area to insure proper equipment performance. The distributor should be equipped with a hand spray with a single nozzle and positive shut-off valve.

3.2 Fabric Lay Down Equipment: Mechanical lay down equipment must be capable of handling full rolls of fabric, and shall be capable of laying the fabric smoothly, without excessive wrinkles and/or folds When manual lay down is required, a length of standard one inch pipe, together with suitable roll tension devices are required for proper roll handling.

3.3 Miscellaneous Equipment: Stiff brooms to smooth the fabric and scissors (or blades) to cut the fabric should be provided. When the use of stiff bristle brooms do not sufficiently smooth fabric, a pneumatic roller shall be used to imbed the fabric into the asphalt sealant prior to placing the pavement overlay.

4.0 CONSTRUCTION METHODS

4.1 Surface Preparation: The surface on which the fabric is to be placed shall be free of dirt, water and vegetation. Cracks must be filled in accordance with the specifications.

4.2 Application of Sealant: The asphaltic sealant must be uniformly spray applied at the specified rate. Quantity specified will vary with the surface condition of the existing pavement (degree of porosity, for example) but will normally be applied at the target rate of 0.35 gallons per square yard (gsy) residual asphalt. At least 0.20 gsy residual asphalt, under heat of the applied overlay, is absorbed by the fabric alone.

4.2.1 Application will be by distributor equipment wherever possible, with hand spraying kept to a minimum. Temperature of the asphalt must be sufficiently high to permit a uniform spray pattern. For asphalt cements, the minimum recommended temperature is 2900 F. (Note: if the fabric is over-sprayed, distributor tank temperatures should not exceed 3250 F to avoid damage to the fabric. For emulsions, temperature of the heavier grades may be as high as 1600 F to insure an optimum spray pattern.

4.2.2 The target width of the asphalt sealant application shall be fabric width plus 2 to 6 inches. Asphalt drools or spills shall be cleaned from the road surface to avoid flushing and possible fabric movement at these asphalt-rich areas.

4.2.3 The quantity of asphalt applied to the fabric is extremely important. The object is to fully seal the membrane, but not to use an excessive quantity which might cause a slippage plane.

4.3 Fabric Placement: The fabric shall be placed into the asphaltic sealant with a minimum of wrinkles prior to the time the asphalt has cooled and lost tackiness. (Note: When emulsions are

used, allow adequate cure time before placing fabric.) The fabric is unrolled so that the bearded (fuzzy) side is unwound into the sealant, thus providing optimum bond between fabric and pavement during the construction process.

4.3.1 As directed by the Contracting Officer Technical Representative, wrinkles severe enough to cause "folds" shall be slit and laid flat. Brooming or pneumatic rolling will maximize fabric contact with the pavement surface. Small wrinkles which flatten under compaction and which are not detrimental to performance do not need to be removed.

4.3.2 Overlap of fabric joints should be minimal, although an overlap of 6 inches is recommended to insure full closure of the joint. Transverse joints should be "shingled" in the direction of paving lay down to prevent edge pick-up by the paver. Additional sealant of about 0.20 gsy should be applied to fabric joints. No fabric shall be left unprotected and open to traffic. Only the amount that will be over layed by the end of each working day shall be installed in that given day.

4.4 Hot Mix Overlay: Placement of the hot mix overlay should closely follow fabric lay down. In the event that the sealant bleeds through the fabric before the hot mix is placed, it may be necessary to blot the sealant by spreading sand or hot mix over the affected areas. This will prevent any tendency for construction equipment to pick up the fabric when driving over it.

4.4.1 Most satisfactory lay down of the hot mix can be accomplished at temperatures below 3000 F. Temperature of the mix in no case should exceed 3250 F. Turning of the paver and other vehicles must be gradual to avoid movement or damage to the membrane. Minimum compacted thickness of 1-1/2 inches is recommended.

SECTION 02600

ASPHALTIC CONCRETE PAVEMENT

PART 1 - GENERAL

1.0 DESCRIPTION

It is the intent of this specification to construct plant mix bituminous pavement in conformance with the Standard Specifications of the New York State Department of Transportation, Design and Construction Division, May 1, 2008, Section 401, Plant Mix Pavement - General. Omit 401-2.01 and 401-4.

1.1 DEFINITIONS

1.1.1 Pavement shall mean the various courses of plant mix bituminous material.

1.1.2 References to the "Engineer, "Regional Director, "Deputy Chief Engineer" and "Department" shall mean the Contracting Officer.

1.2 SUBMITTALS: See 2.1 MATERIAL APPROVALS.

PART 2 - PRODUCTS

2.0 PAVEMENT COMPOSITION: The various types of courses included under this work are specified as:

A. NYSDOT Section 403, Asphalt Concrete - Type 7 Top Course

B. NYSDOT Section 403, Asphalt Concrete - Type 3 Binder Course

C. Asphalt Emulsion Tack Coat, NYSDOT Section 702.

D. Joint and Crack Filler, NYSDOT Section 702.

2.1 MATERIAL APPROVALS

2.1.1 The various bituminous pavement items included in this specification shall be mixed at a plant regularly supplying the same items to the New York State Department of Transportation.

2.1.2 Aggregates for the various bituminous pavement items shall be obtained from sources currently approved by the New York State Department of Transportation. Evidence of state

approval shall be furnished to the Contracting Officer at least 10 days prior to the start of pavement construction.

2.1.3 Bituminous material and mineral filler shall be accepted on the basis of certification by the manufacturer or producer that the material complies with the material requirements of the specifications in all respects. Certification shall be furnished to the Contracting Officer before final acceptance of the item.

3.0 ASPHALTIC CONCRETE OVERLAY

3.0.1 Crack Repair: Repair cracks larger than 1/8 inch in width to the satisfaction of the Contracting Officers' Technical Representative using the specified joint and crack filler material. Joints shall be clean and blown dry prior to placement of the repair material.

3.0.2 Tack Coat: Power broom clean and apply a light application of asphalt emulsion tack coat to existing pavements receiving asphalt overlay. Plan work so that no more than the necessary tack coat for the days operation is placed on the surface. Keep all traffic not essential to the work off the tack coat. Apply tack coat to vertical faces of existing pavements and adjacent concrete surfaces.

3.0.3 Overlay Construction: Construction of asphaltic concrete overlay shall be in accordance with Paragraph 3.1.

3.1 ASPHALT PAVEMENT REPAIR AND NEW ASPHALT PAVEMENT

3.1.1 Construction of bituminous pavements shall comply in all respects to the requirements of the referenced Department of Transportation specification.

SECTION 02661

WATER LINES

1.0 DESCRIPTION OF WORK

This specification covers the furnishing and installation of water lines. Products shall match existing materials or shall be as directed by the Contracting Officer. Installation procedures shall be in accordance with the product manufacturers recommendations. Demolition and removal of materials shall be as required to support the work.

2.0 Products

Piping for water lines shall be galvanized steel, polyvinyl chloride (PVC) or copper tubing. Piping for water distribution and supply lines shall be ductile iron, polyvinyl chloride (PVC), or reinforced concrete.

2.1 Copper Tubing: ASTM B 88, Type K, annealed, with compression pattern flared joints.

2.2 Ductile Iron Pipe: ANSI A21.51, 150 psi working pressure. Pipe shall be cement mortar lined in accordance with ANSI A21 4. Joints shall conform to ANSI A21.11. Flanges shall conform to ANSI A21.15.

2.3 Polyvinyl chloride (PVC) Plastic Pipe: All pipe, couplings, and fittings shall be manufactured of material conforming to ASTM D 1784, Class 12454B, designated as PVC 1120 in ASTM D 1785.

2.4 Reinforced and Pre-stressed Concrete Pipe: Steel cylinder reinforced concrete pipe shall conform to ANNA C300, C301, or C303 and shall be designed to withstand a working pressure of not less than 150 psi, with bell and spigot steel joints and gaskets.

2.5 Galvanized Steel Pipe. ASTM A 120, standard weight, screwed joints.

2.6 Valves:

2.6.1 Check Valves shall be designed for a minimum working pressure of 150 psi. Valves 2 inches and smaller shall be all bronze with screwed fittings and shall conform to Fed. Spec. WW-V-51, Class B. Valves larger than 2 inches shall be iron body, bronze-mounted with flanged ends, and non-slam type. Flanges shall be the 125-pound type conforming to ANSI B16.1.

2.6.2 Gate Valves shall be designed for a working pressure of not less than 150 psi. Valves smaller than 3 inches shall be all bronze and shall con- form to Fed. Spec. WW-V-54, Type 1, Class B. Valves 3 inches and larger shall be iron body, bronze mounted, and shall conform to ANNA C500.

2.6.3 Rubber Seated Butterfly Valves shall conform to the performance requirements of ANNA C504.

2.6.4 Indicator Post for Valves shall conform to the requirements of NFPA No. 24.

2.7 Fire Hydrants: AWWA C502 or C503.

2.8 Fire Hydrant Hose Houses: NFPA No. 24.

2.9 Disinfection Materials: Liquid chlorine conforming to ANNA B301 or calcium or sodium hypochlorite conforming to ANNA B300.

3.0 EXECUTION

3.1 Installation:

3.1.1 Water Lines shall not be laid in the same trench with sewer lines, gas lines, fuel lines, or electric wiring.

3.1.2 Copper Tubing shall not be installed in the same trench with ferrous piping materials.

3.1.3 Roads, Railroads, and Airfields: Sleeves under railroads shall be in accordance with the criteria contained in the Manual for Railway Engineering of the American Railway Engineering Association. Where sleeves are required in all other cases, the pipe sleeve shall be rigid conduit and shall have a minimum clearance of at least 2 inches between the inner wall of the sleeve and the maximum outside diameter of the sleeved pipe and joints shall be provided.

3.1.4 Structures: Where water pipe is required to be installed within three feet of existing structures, the water pipe shall be sleeved as required for roads, railroads, and airfields.

3.2 Joint Deflection:

3.2.1 Ductile Iron Pipe: The maximum allowable deflection will be as given in ANNA C600.

3.2.2 Flexible Plastic Pipe: Maximum offset in alignment between adjacent pipe joints shall not exceed 5 degrees.

3.2.3 Reinforced Concrete Pipe: Maximum allowable deflections from a straight line or grade, as required by vertical curves, horizontal curves, or offsets, will be 5 degrees.

3.2.4 Steel Pipe: For pipe with bell and spigot rubber gasket joints, maximum allowable deflections from a straight line or grade, as required by vertical curves, horizontal curves, or offsets will be 5 degrees.

3.3 Placing and laying:

3.3.1 The Following Codes shall govern pipe installations: RTRP, ASTM D 3839; PE and PB, ASTM D 2774; PVC, ANNA M23.

3.3.2 Pipe Passing Through Walls of valve pits and structures shall be provided with cast iron wall sleeves.

3.4 Service Lines: Service lines 2 inches and smaller shall be connected to the main by a directly tapped corporation stop or by a service clamp. A corporation stop and a copper gooseneck shall be provided with either type of connection. Service lines 1 1/2 inches and smaller shall have a service stop. Service lines 2 inches or larger shall have a gate valve.

3.5 Setting of Fire Hydrants: Each hydrant shall be connected to the main with a 6 inch branch line having at least as much cover as the distribution main. Not less than 7 cubic feet of free draining broken stone or gravel shall be placed around and beneath the waste opening of dry barrel hydrants to ensure drainage.

3.6 Thrust Blocks: Plugs, caps, tees, and bends deflecting 22 1/2 degrees or more, either vertically or horizontally, on waterlines 6 inches in diameter or larger, and fire hydrants shall be provided with thrust blocking or metal tie rods and clamps or lugs.

3.7 Hydrostatic Tests: The pipeline shall be subjected to both a pressure test and a leakage test.

3.7.1 Pressure Test: After the pipe has been installed and the trench has been partially backfilled, leaving the joints exposed for examination, the pipe shall be filled with water in a manner to expel all air. The pipeline shall be subjected to a test pressure of 100 psi or 150 percent of the working pressure, whichever is greater, for a period of at least one hour.

3.7.2 Leakage Test: A standard one hour leakage test shall be performed subsequent to or concurrently with the pressure test and shall meet an allowable leakage rate according to the following formula: L , NDP/K, where L equals the allowable leakage in gallons per hour, N is the number of field joints in the length of pipeline tested, D is the nominal diameter of the pipe in inches, P is the square root of the average test pressure in psig, and K is equal to 4,000 for asbestos cement pipe and 7,400 for other materials.

3.8 Disinfection: Each unit of completed water line shall be disinfected as prescribed by ANNA C601.

SECTION 02700

SEWERAGE AND DRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

This section includes sewerage and drainage systems outside the building. Systems include the following:

A. Sanitary sewerage.

B. Storm drainage.

C. Force main.

1.2 SUBMITTALS

1.2.1 Drawings for precast concrete manholes and other structures. Include frames, covers, and grates.

2.1 PIPES AND FITTINGS

2.1.1 Hub-and-Spigot, Cast-Iron Soil Pipe and Fittings: ASTM A 74, service and extra-heavy classes, gray cast iron, for gasketed joints with gaskets.

2.1.2 Ductile-Iron Pipe: AWWA C151, Class 150 minimum, for push-on joints, with gaskets.

2.1.3 Corrugated-Steel Pipe: ASTM A 760 (ASTM A 760M), Type I, made from ASTM A 444 (ASTM A 444M), zinc-coated steel sheet for banded joints with fittings and bands.

2.1.4 Corrugated-Aluminum Pipe: ASTM B 745 (ASTM B 745M), Type I, made from ASTM B 744 (ASTM B 744M), aluminum-alloy sheet for banded joints with fittings and bands.
2.1.5 Corrugated, Polyethylene (PE) Drainage Tubing and Fittings: AASHTO M 252 Interim, Type S, with smooth waterway for coupling joints, with couplings
2.1.6 Polyvinyl Chloride (PVC), Cellular-Core Plastic Pipe: ASTM F 891, Sewer and Drain Series, PS 50 minimum stiffness, for solvent-cemented joints, with fittings.

A. Fittings: ASTM D 2729 or ASTM D 3034, polyvinyl chloride (PVC) sewer pipe fittings.

2.1.7 Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76 (ASTM C 76M), Class III, Wall B, for gasketed joints, with gaskets.

2.2 MANHOLES

2.2.1 Precast Concrete Manholes: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for rubber gasket joints, and steps or ladder.

2.2.2 Precast Concrete Manholes: ASTM C 858, precast, reinforced concrete, designed according to ASTM C 857 for structural loading. Include depth, shape, and dimensions indicated, with provision for rubber gasket joints with steps or ladder.

2.2.3 Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, heavy-duty ductile iron. Include 24-inch (610 mm) inside diameter by 7 to 9-inch (178 to 229 mm) riser with 4-inch (100 mm) minimum width flange, and 26-inch (660 mm) diameter cover. Include indented top design with lettering, equivalent to the following, cast into cover:

A. Sanitary Sewerage Piping Systems: SANITARY SEWER.

B. Storm Drainage Piping Systems: STORM SEWER.

C. Piping Systems Containing Sanitary Sewage: SANITARY SEWER.

2.3 CATCH BASINS

2.3.1 Precast Concrete Catch Basins: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for rubber gasket joints with steps or ladder.

2.3.2 Precast Concrete Catch Basins: ASTM C 858, precast, reinforced concrete, designed according to ASTM C 857 for structural loading. Include depth, shape, and dimensions indicated, with provision for rubber gasket joints.

2.3.3 Frames and Grates: ASTM A 536, Grade 60-40-18, heavy-duty ductile iron, 24-inch (610 mm) inside diameter by 7 to 9-inch (178 to 229 mm) riser with 4-inch (100 mm) minimum width flange, and 26-inch (660 mm) diameter flat grate having small square or short-slotted drainage openings.

2.4 STORM-WATER INLETS

2.4.1 Curb Inlets: Made with vertical curb opening, of materials and dimensions according to utility standards.

2.4.2 Gutter Inlets: Made with horizontal gutter opening, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.

2.4.3 Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.
2.4.4 Frames and Grates: Heavy-duty frames and grates according to utility standards.
2.4.5 Curb Inlets: Vertical, curb-opening type, of materials and dimensions indicated.

2.4.6 Gutter Inlets: Horizontal, gutter-opening type, of materials and dimensions indicated. Include heavy-duty frames and grates.

2.4.7 Combination Inlets: Vertical, curb-opening and horizontal, gutter-opening type, of materials and dimensions indicated. Include heavy-duty frames and grates.

2.4.8 Frames and Grates: ASTM A 536, Grade 60-40-18, heavy-duty ductile iron, frames and flat grates, of dimensions indicated. Include small square or short-slotted drainage openings in grates.

2.5 CONCRETE - See Section 03300

2.6 PROTECTIVE COATINGS

2.6.1 General: Include factory or field-applied protective coatings to structures and appurtenances.

2.7.1 Description: ASME A112.36.2M, round, cast-iron housing with clamping device and round, secured, scoriated, cast-iron cover. Include cast-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:

A. Light Duty: In earth or grass, foot-traffic areas.

B. Medium Duty: In paved, foot-traffic areas.

C. Heavy Duty: In vehicle-traffic service areas.

D. Extra Heavy Duty: In roads.

2.7.2 Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, service class, cast-iron soil pipe and fittings.

2.8 DRAINS

2.8.1 Area Drains: ASME A112.21.1M, round, cast-iron body with anchor flange and round, secured, cast-iron grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated. Use units with top-loading classifications according to the following applications:

A. Medium Duty: In paved, foot-traffic areas.

B. Heavy Duty: In vehicle-traffic service areas.

2.8.2 Cast-Iron Trench Drains: ASME A112.21.1M, 6-inch (152 mm) wide top surface, rectangular body with anchor flange or other anchoring device and rectangular, secured grate. Include units of total lengths indicated and number of bottom outlets with inside calk or spigot connections, of sizes indicated. Use units with top-loading classifications according to the following applications:

A. Medium Duty: In paved, foot-traffic areas.

B. Heavy Duty: In vehicle-traffic service areas.

C. Extra Heavy Duty: In roads.

PART 3 - EXECUTION

3.1 EARTHWORK: Excavating, trenching, and backfilling are specified in Section 02200.

3.2 IDENTIFICATION: Materials and their installation are specified in Section 02200. Arrange for installation of green warning tapes directly over piping and at outside edges of underground structures.

A. Use warning tapes or detectable warning tape over ferrous piping.

B. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.3 SEWERAGE PIPE APPLICATIONS

3.3.1 General: Include watertight joints.

3.3.2 Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to the following applications.

A. Pipe Sizes 2 to 6 Inches (50 and 150 mm): Polyvinyl chloride (PVC), cellular-core plastic pipe; ASTM D 3034, PVC, solvent-cement, sewer pipe fittings; and solvent-cemented joints.

B. Pipe Sizes 4 and 10 Inches (50 and 250 mm): Hub-and-spigot, service class, cast-iron soil pipe and fittings; compression-type gaskets; and gasketed joints.

C. Pipe Sizes 8 and 12 Inches (200 and 300 mm): ASTM D 3034, polyvinyl chloride (PVC) sewer pipe and fittings; solvent-cemented joints; or with gaskets and gasketed joints.

E. Pipe Sizes 12 and 15 Inches (300 and 375 mm): ASTM D 3034, polyvinyl chloride (PVC) sewer pipe and fittings; solvent-cemented joints; or with gaskets and gasketed joints.

F. Pipe Sizes 12 and 15 Inches (300 and 375 mm): Reinforced-concrete sewer pipe and fittings; rubber gaskets; and gasketed joints.

3.4.2 Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to the following applications.

A. Pipe Size 3 Inches (80 mm): Ductile-iron pipe; standard-pattern, cast-iron or ductile-iron fittings; rubber gaskets; and gasketed joints.

3.5.1 General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of underground sewerage and drainage systems piping. Location and arrangement of piping layout take into account many design considerations. Install piping as indicated, to extent practical.

3.5.2 Install force-main piping according to AWWA C600.

A. Install piping between and connect to building's force main and termination point indicated.

B. Install piping between and connect to packaged sewage pump station outlet and termination point indicated.

C. Install piping with restrained joints at horizontal and vertical changes in direction. Use cast-in-place concrete supports and anchors, corrosion-resistant rods and clamps, or piping made with restrained-type-joint ends.

D. Install piping with 36-inch (1000mm) minimum cover.

3.5.3 Tunneling: Install pipe under streets or other obstructions, that cannot be disturbed, by tunneling, jacking, or a combination of both.

3.6 PIPE JOINT CONSTRUCTION AND INSTALLATION

3.6.1 General: Join and install pipe and fittings according to the following.

3.6.2 Hub-and-Spigot, Cast-Iron Soil Pipe and Fittings: With rubber compression gaskets according to CISPI "Cast Iron Soil Pipe and Fittings Handbook," Volume I. Use gaskets that match class of pipe and fittings.

A. Install polyethylene film encasement over cast-iron soil pipe and fittings according to ASTM A 674 or AWWA C105.

3.6.3 Install with top surfaces of components, except piping, flush with final finished surface.

3.6.4 Corrugated-Steel Pipe: Join and install according to ASTM A 798. Use standard joints made with coupling bands, except where special joints are indicated.

3.6.5 Corrugated-Steel Pipe: Join and install according to ASTM A 798. Use soiltight joints made with coupling bands and gaskets, except where other joints are indicated.

3.6.6 Corrugated-Aluminum Pipe: Join and install according to ASTM B 788. Use standard joints made with coupling bands, except where special joints are indicated.

3.6.7 Corrugated-Aluminum Pipe: Join and install according to ASTM B 788. Use soiltight joints made with coupling bands and gaskets, except where other joints are indicated.

3.6.8 Polyethylene (PE) Plastic Pipe and Fittings: As follows:

A. Join pipe, tubing, and fittings with couplings for soiltight joints according to AASHTO "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4 "Joint Properties" and manufacturer's written instructions.

B. Join pipe, tubing, and gasketed fittings with elastomeric seals for watertight joints according to ASTM D 2321 and manufacturer's written instructions.

C. Install according to ASTM D 2321 and manufacturer's written instructions.

3.6.9 Polyvinyl Chloride (PVC) Plastic Pipe and Fittings: As follows:

A. Join solvent-cement-joint pipe and fittings with solvent cement according to ASTM D 2855 and ASTM F 402.

B. Join pipe and gasketed fittings with elastomeric seals according to ASTM D 2321.

C. Join profile sewer pipe and ribbed drain pipe and gasketed fittings with elastomeric seals according to ASTM D 2321 and manufacturer's written instruction.

D. Install according to ASTM D 2321.

3.6.10 Concrete Pipe and Fittings: Install according to ACPA "Concrete Pipe Handbook." Use the following seals:

A. Round Pipe and Fittings: ASTM C 443 (ASTM C 443M), rubber gaskets.

B. Elliptical Pipe: ASTM C 877 (ASTM C 877M), Type I, sealing bands.

C. Arch Pipe: ASTM C 877 (ASTM C 877M), Type I, sealing bands.

3.6.11 System Piping Joints: Make joints using system manufacturer's couplings, except where otherwise specified.

3.6.12 Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and fit both systems' materials and dimensions.

3.7 MANHOLE INSTALLATION

3.7.1 General: Install manholes, complete with accessories, as indicated.

3.7.2 Form continuous concrete channels and benches between inlets and outlet, where indicated.

3.7.3 Set tops of frames and covers flush with finished surface where manholes occur in pavements. Set tops 3 inches (76 mm) above finished surface elsewhere, except where otherwise indicated.

3.7.4 Place precast concrete manhole sections as indicated, and install according to ASTM C 891.

A. Provide rubber joint gasket complying with ASTM C 443 (ASTM C 443M), at joints of sections.

B. Apply bituminous mastic coating at joints of sections.

3.8 CATCH BASIN INSTALLATION

3.8.1 Construct catch basins to sizes and shapes indicated.

3.8.2 Set frames and grates to elevations indicated.

3.9 STORM DRAINAGE INLET INSTALLATION

3.9.1 Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.

3.9.2 Construct riprap of broken stone, as indicated.

3.9.3 Install outlets that spill onto grade, anchored with concrete, where indicated.

3.10 CONCRETE PLACEMENT: Place cast-in-place concrete according to ACI 318, ACI 350R, and as indicated.

3.11 CLEANOUT INSTALLATION

3.11.1 Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

3.11.2 Set cleanout frames and covers in earth in a cast-in-place concrete block, 18 by 18 by 12 inches (450 by 450 by 300 mm) deep. Set with tops 1 inch (25 mm) above surrounding earth grade.

3.11.3 Set cleanout frames and covers in concrete paving with tops flush with surface of paving.

3.12 DRAIN INSTALLATION

3.12.1 Install type drains in locations indicated.

3.12.2 Embed drains in a 4-inch (100mm) minimum depth of concrete around bottom and sides.

3.12.3 Fasten grates to drains if indicated.

3.12.4 Set drain frames and covers with tops flush with surface of paving.

3.13 TAP CONNECTIONS

3.13.1 Make connections to existing piping and underground structures so finished work conforms as nearly as practical to requirements specified for new work.

3.13.2 Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch (150 mm) overlap, with not less than 6 inches (150 mm) of 3000 psi (20.7 MPa), 28-day, compressive-strength concrete.

3.13.3 Make branch connections from side into existing piping, sizes 4 to 20 inches (100 to 500 mm) by removing a section of existing pipe and installing a wye fitting into existing piping. Encase entire wye with not less than 6 inches (150 mm) of 3000-psi (20.7-MPa), 28-day, compressive-strength concrete.

3.13.4 Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.14 FIELD QUALITY CONTROL

3.14.1 Clear interior of piping and structures of dirt and superfluous material as the work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.

A. In large, accessible piping, brushes and brooms may be used for cleaning.
B. Place plug in end of incomplete piping at end of day and whenever work stops.

C. Flush piping between manholes and other structures, if required by authorities having jurisdiction, to remove collected debris.

3.14.2 Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (600 mm) of backfill is in place, and again at completion of the Project.

3.14.3 Test new piping systems and parts of existing systems that have been altered, extended, or repaired for leaks and defects.

A. Sanitary Sewerage: Perform hydrostatic test.

1. Allowable leakage is a maximum of 50 gallons per inch (4.6 L per mm dimension) nominal pipe size, for every mile (km) of pipe, during a 24-hour period

B. Sanitary Sewerage: Perform air test according to UNI-B-6.

1. Option: Test concrete piping according to ASTM C 924 (ASTM C 924M).

C. Force Main: Perform hydrostatic test according to AWWA C600, Section 4 "Hydrostatic Testing." Test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than 1-1/2 times maximum system operating pressure, but not less than 150 psig (1035 kPa).

3.14.4 Manholes: Perform hydraulic test according to ASTM C 969 (ASTM C 969M).

3.14.5 Leaks and loss in test pressure constitute defects that must be repaired.

3.14.6 Replace leaking piping using new materials and repeat testing until leakage is within allowances specified.

SECTION 02740

SEPTIC SYSTEMS

PART 1 - GENERAL

1.1 DEFINITIONS

1.1.1 Absorption Field: Subsurface piping or other means of wastewater disposal.

1.1.2 Leaching Piping: Perforated pipe and pipe fittings or plain pipe with open joints in absorption field.

1.1.3 Solid Piping: Pipe and pipe fittings installed with tight joints between building's sewer, septic tank, and other septic system structures to, but not including, leaching piping.

1.1.4 Absorption Trench: System of single leaching pipes installed in trenches for wastewater disposal.

1.1.5 Seepage Bed: System of multiple, parallel leaching pipes installed in bed for wastewater disposal.

1.2 SUBMITTALS

1.2.1 General: Submit each item in this Article.

1.2.2 Product data for the following:

A. Automatic dosing siphons.

B. Sewage pumps and controls.

1.2.3 Drawings for the following precast, reinforced-concrete structures, including manhole openings, covers, pipe connections, and accessories:

A. Septic tanks.

B. Dosing tanks.

C. Distribution boxes.

1.2.4 Wiring diagrams detailing sewage-pump, power, and control systems, differentiating between manufacturer- and field-installed wiring.

1.2.5 Maintenance data for sewage pumps and controls to include in the operating and maintenance manuals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1 Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:

2.1.2 Manufacturers: Subject to compliance with requirements, provide products by one of the following:

A. Plastic, Automatic Dosing Siphons:

1. Fluid Dynamic Siphons, Inc.

2. Mabarex, Inc.

B. Sewage Pumps:

1. ABS Pumps, Inc.

2. Aurora/Hydromatic Pumps, Inc., General Signal.

3. Federal Pump Corp.

4. Goulds Pumps, Inc.

5. Weil Pump Co.

2.2 PIPES AND FITTINGS

2.2.1 Polyvinyl Chloride (PVC) Sewer Pipe and Fittings: ASTM D 3034, SDR 35, nonperforated, for solvent-cement joints.

A. Solvent Cement: ASTM D 2564.

2.2.2 Polyvinyl Chloride (PVC) Sewer Pipe and Fittings: ASTM D 2729, perforated, for solvent-cement joints.

A. Solvent Cement: ASTM D 2564.

2.3 CLEANOUTS

2.3.1 Description: ASME A112.36.2M, with round, flanged, cast-iron housing, and secured, scoriated, medium-duty loading class, cast-iron cover. Include cast-iron ferrule and countersunk brass cleanout plug.

2.4 PRECAST CONCRETE SEPTIC TANKS

2.4.1 Description: Precast, reinforced-concrete tank and covers, designed for structural loading according to ASTM C 890 and made according to ASTM C 913. Include 2 chambers with coal-tar epoxy coating, 15-mil (0.381-mm) minimum thickness covering internal areas above water line and extending at least 4 inches (100 mm) below that point. Include pipe and fittings.

2.4.2 Resilient Connectors: ASTM C 923 (ASTM C 923M), of size required for piping, fitted into tank inlet and outlet openings.

2.5 DOSING TANKS

2.5.1 Description: Precast, reinforced-concrete tank and cover, designed for structural loading according to ASTM C 890 and made according to ASTM C 913. Include coaltar epoxy coating, 15-mil (0.381-mm) minimum thickness covering internal areas above water line and extending at least 4 inches (100 mm) below that point. Include pipe and fittings.

2.5.2 Resilient Connectors: ASTM C 923 (ASTM C 923M), of size required for piping, fitted into inlet and outlet openings.

2.5.3 Method of Discharge: Automatic dosing siphon.

2.5.4 Method of Discharge: Sewage pumps.

2.6 AUTOMATIC DOSING SIPHONS

2.6.1 Description: Manufactured siphon assembly of molded high-density polyethylene (HDPE) trap, pipe, and bell, with polyvinyl chloride (PVC) vent piping and stainless-steel bolts.

2.6.2 Description: Manufactured siphon assembly of cast-iron trap, pipe, and bell, with cast-iron or polyvinyl chloride (PVC) vent piping and stainless-steel bolts.

2.6.3 Unit Size: Same as dosing tank outlet pipe size, unless another size is indicated.

2.7 SEWAGE PUMPS

2.7.1 Description: UL 778, submersible-type, direct-connected, end-suction, single-stage, centrifugal sewage pumps. Include the following features:

A. Pump Arrangement: Simplex.

B. Pump Arrangement: Duplex.

2.7.2 Casing: Cast iron, with cast-iron legs that elevate pump to permit flow into impeller. Include discharge companion flange arranged for vertical discharge and suitable for plain-end pipe connection.

2.7.3 Impeller: ASTM A 48, Class No. 25 A cast iron, statically and dynamically balanced, open or semiopen nonclog design, overhung, keyed to shaft, and secured by locking capscrew.

2.7.4 Impeller: ASTM B 584 cast bronze, statically and dynamically balanced, open or semiopen nonclog design, overhung, keyed to shaft, and secured by locking capscrew.

2.7.5 Pump and Motor Shaft: Stainless steel, with factory-sealed, grease-lubricated ball bearings.

2.7.6 Seals: Double mechanical seals.

2.7.7 Motor: NEMA MG 1, hermetically sealed capacitor-start type, with built-in thermal-overload protection and grease-lubricated ball bearings. Include motor of size that is nonoverloading within full range of pump performance curves. Include 3-conductor, waterproof power cable of length required, but not less than 20 feet (6 m), with grounding plug and cable-sealing assembly for connection at pump.

2.7.8 Moisture-Sensing Probe: Include an internal moisture sensor, a waterproof cable of length required, but not less than 20 feet (6 m), with cable-sealing assembly for connection at pump, and a moisture alarm.

2.7.9 Pump Discharge Piping: Factory or field fabricated, ASTM A 53, Schedule 40, galvanized-steel pipe, except where other specific material is indicated.

2.7.10 Controls: Wall mounted, in a NEMA 250, Type 1 enclosure. Include 2 micro-pressure switches in NEMA 250, Type 6 enclosures; mounting rod; and electric cables.

2.7.11 Controls: Wall mounted, in a NEMA 250, Type 1 enclosure. Include 3 micro-pressure switches in NEMA 250, Type 6 enclosures; mounting rod; and electric cables. Include an automatic alternator to alternate operation of pumps on successive cycles and operate both units when 1 pump cannot handle the load.

2.7.12 Controls: Wall mounted, in a NEMA 250, Type 1 enclosure. Include 2 mercury float switches in NEMA 250, Type 6 enclosures; mounting rod; and electric cables.

2.7.13 Controls: Wall mounted, in a NEMA 250, Type 1 enclosure. Include 3 mercury float switches in NEMA 250, Type 6 enclosures; mounting rod; and electric cables. Include an automatic alternator to alternate operation of pumps on successive cycles and operate both units when 1 pump cannot handle the load.

2.7.14 Finish: Manufacturer's standard paint applied to factory-assembled and -tested pump units before shipping.

2.7.15 Manufacturer's Preparation for Shipping: Clean flanges and exposed, machined metal surfaces and treat with an anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.

2.8 DISTRIBUTION BOXES

2.8.1 Description: Precast, reinforced-concrete box and cover, designed for structural loading according to ASTM C 890 and made according to ASTM C 913. Include coal-tar epoxy coating, 15-mil (0.381-mm) minimum thickness covering internal areas above water line and extending at least 4 inches (100 mm) below that point. Include pipe and fittings.

2.8.2 Resilient Connectors: ASTM C 923 (ASTM C 923M), of size required for piping, fitted into inlet and outlet openings.

2.9 LEACHING TRENCH MATERIALS

2.9.1 Filtering Material: ASTM D 448, Size No. 24, 3/4 to 2-1/2-inch (19 to 63 mm) size, washed, crushed stone or gravel.

2.9.2 Filter Mat: Geotextile woven or spun filter fabric, in 1 or more layers, for minimum total unit weight of 3.0 oz. per sq. yd. (0.10 kg/sq. m).

2.10 ABSORPTION MOUND MATERIALS

2.10.1 Backfill material consisting of clean crushed rock or gravel having a gradation such that 100 percent passes the 2-inch sieve and zero percent passes the 1/2 inch sieve.

2.10.2 Sand fill shall be medium course with less than 20 percent by weight finer than 0.05 millimeter material.

2.10.3 The topsoil used shall have a compacted percolation rate between 5 and 30 minutes per inch.

PART 3 - EXECUTION

3.1 EARTHWORK: Excavating, trenching, and backfilling are specified in Section 02200.

3.2 PIPE JOINT CONSTRUCTION AND INSTALLATION

3.2.1 Join and install polyvinyl chloride (PVC) pipe as follows:

A. Join solvent-cement-type pipe and fittings with solvent cement according to ASTM D 2855 and ASTM F 402.

B. Install solid piping according to ASTM D 2321.

C. Install leaching piping according to ASTM D 2321 and ASTM F 481.

3.3 CLEANOUT INSTALLATION

3.3.1 Install cleanouts and extension from piping to cleanout at grade as indicated. Set cleanout housing and cover in concrete block 18 by 18 by 12 inches (450 by 450 by 300 mm) deep, except where location is in concrete paving. Set top of cleanout 1 inch (25 mm) above surrounding earth grade, or flush with grade when installed in paving.

3.3.2 Refer to Section 03300 Concrete for formwork, reinforcing, and concrete.

3.4 SEPTIC TANK INSTALLATION

3.4.1 Install precast concrete septic tanks at invert elevations indicated, according to ASTM C 891 and manufacturer's written instructions. Set level and plumb.

3.4.2 Seed tanks with sewage sludge and fill tank with clear water.

3.5 DOSING TANK INSTALLATION

3.5.1 Install dosing tanks at invert elevations indicated according to ASTM C 891 and manufacturer's written instructions. Set level and plumb.

3.5.2 Automatic Dosing Siphons: Install according to manufacturer's written instructions. Include overflow and outlet pipes. Encase siphon in concrete. Set bell and vent, overflow, and outlet pipes at dimensions indicated for unit used. Discharge to septic system.

3.5.3 Sewage Pumps: Install pumps set on dosing tank compartment floor. Discharge to septic system piping.

3.5.4 Fill dosing tanks with water.

3.6 DISTRIBUTION BOX INSTALLATION

3.6.1 Install reinforced-concrete distribution boxes at invert elevations indicated according to ASTM C 891 and manufacturer's written instructions. Set level and plumb.

3.7 LEACHING FIELD INSTALLATION

3.7.1 Excavate trenches as shown on the drawings and 24” minimum for a single pipe in absorption trenches.

3.7.2 Excavate beds of width indicated and 24 inches (600 mm) deep minimum for multiple pipes in seepage beds.

3.7.3 Filtering Material: Place a supporting layer of filtering material over the compacted trench base to a compacted depth not less than 6 inches (150 mm) below bottom of pipe, except as otherwise indicated.

3.7.4 Grading: Install distribution piping headers at a minimum grade of 1/8 inch per foot or 1 percent (1:100) and a maximum grade of 1/4 inch per foot or 2 percent (1:50). Install absorption field piping at a minimum grade of 1/32 inch per foot or 1/4 percent (1:400) and a maximum grade of 1/16 inch per foot or 1/2 percent (1:200), downward in direction of flow.

3.7.5 Absorption Field Piping: Lay piping solidly bedded in filtering material. Include full bearing for each pipe section throughout its length to true grades and alignment and continuous slope.

A. Install thermoplastic pipe according to ASTM F 481.

B. Lay perforated pipe with perforations down and joints tightly closed according to pipe manufacturer's recommendations.

C. Install elbow fittings with tight joints.

D. Place additional filtering material around sides and on top to a compacted depth of 8 inches (200 mm) above top of pipe after drainage lines have been installed except as otherwise indicated.

3.7.6 Filter Mat: Place over filter material before backfilling.

3.7.7 Backfill absorption trenches immediately with excavated soil, mounding but not compacting soil above original grade.

3.8 CONNECTIONS

3.8.1 Make piping connections between sanitary sewers and other piping served by septic systems and septic tank.

3.8.2 Make piping connections between septic system structures and leaching fields.

3.8.3 Install check valve and gate or ball valve on each sewage pump discharge and connect to septic system piping.

3.8.4 Install electrical connections for power and controls for sewage pumps.

3.8.5 Electrical power and control wiring and connections are per manufacuter's recommendations.

3.9 EARTHWORK REQUIREMENTS FOR SEWAGE ABSORPTION MOUNDS INSTALLATION

Provide sewage absorption mound as indicated the drawings.

3.9.1 Site Preparation

A. Provide dutiable markers, stakes, barriers, and rope to establish the perimeter of the mound system. Do not operate vehicular traffic over the area except for the specific equipment required for the performance of the work.

B. Plow the area within the confines of the mound perimeter as indicated. Use a two-bottom or larger moldboard plow. Remove 7 to 8 inches of existing soil by plowing parallel to the contour of the site. Do not use single bottom plow. Avoid the formation of wheel ruts.

3.9.2 Fill Placement

A. Place fill material on the up slope edges of the plowed area. Minimize traffic on the down slope side by transporting the fill to the site uphill of the mound area.

B. Move fill material into place using a small track type tractor with blade. Maintain a minimum depth of six inches of material beneath the tracks of the tractor to minimize compaction of the natural soil. Place the fill material in this fashion until the height of the fill material is established at the top of the absorption bed as indicated.

C. Use the blade of the tractor to form the absorption bed. Hand level the bottom of the bed to the proper elevation within 0.1 foot. Shape the sides of the absorption bed by hand to the dimensions indicated.

3.9.3 Distribution Network Piping

A. Carefully place the coarse aggregate in the bed. Level the coarse aggregate to the indicated depth and dimensions. Do not create ruts, depressions, irregularities, or areas of increased compaction in the surface of the bed.

B. Assemble the distribution network on the aggregate. The manifold shall be placed so that drainage occurs into the absorption bed laterals. The laterals shall be laid level within 0.01 feet.

C. Place additional coarse aggregate, as required, under absorption bed laterals to provide continuous and level support full length of laterals.

D. Place additional coarse aggregate over the crown of the laterals to the depth and dimensions indicated.

E. Place backfill barrier or filter fabric over entire area of coarse aggregate as indicated.

3.9.4 Covering

A. Place textured fill material (silt loam) over the top of the backfill barrier to the depth and dimensions indicated. Use only light weight spreading equipment. Do not create ruts, furrows, or areas of increased compaction.

B. Place topsoil over textured fill to the depth indicated. Grade topsoil as indicated using lightweight spreading equipment. Blend topsoil into adjacent undisturbed earth to the dimensions indicated or as required by site topography so as to establish gradual grade between new topsoil and existing surfaces.

C. Establish swale around absorption mound as indicated on drawings to provide surface run off channel around absorption mound.

D. Seed entire mound using grasses adapted to the area. Seeding shall extend a minimum of one foot beyond the new topsoil for the entire perimeter of the mound. Grasses used shall be drought tolerant.

E. Cover seeded area with layer of straw of sufficient depth to retain moisture in the topsoil and promote germination.

SECTION 02800

Curbing and Gutters

1.1 DESCRIPTION

This work shall consist of the construction of curb or gutter or combination curb and gutter and resetting of old curb in accordance with these specifications and the lines and grades shown on the plans or established by the Contracting Office. The types of curbing and work covered by these specifications are as follows:

Conventionally Formed or Machine Formed Concrete Curb

Conventionally Formed or Machine Formed Concrete Curb and Gutter

Precast Concrete Curb

Resetting Old Curb

Asphalt Concrete Curb

1.2 MATERIALS

The Materials shall meet all requirements Materials:

Concrete Grouting Material

Mortar Sand

Caulking Compound

Pre-molded Resilient Joint Filler

Epoxy Coated Bar Reinforcement Grade 60

Membrane Curing Compound

Precast Concrete Curb

Asphalt Concrete Curb

Epoxy Polysulfide Binder

1.2.1. Concrete for Conventionally Formed Curb and Curb and Gutter. The material ad requirements, mix preparation, and manufacturing of concrete shall comply with the requirements for concrete as specified.

1.2.2. Concrete for Machine Formed Curb and Curb and Gutter. The material requirements, mix preparation and manufacturing of concrete shall comply with the requirement for concrete as specified.

1.3 CONSTRUCTION DETAILS

1.3.1. Conventionally Formed or Machine Formed Concrete Curb, Conventionally Formed or Machine Formed Concrete Curb, or curb and gutter shall be either conventionally formed or machine formed to the size and shape shown on the drawings.

A. Conventionally Formed Curb or Curb and Gutter.

1. Casting Segments. Curb or curb and gutter shall be cast in segments having a uniform length of approximately 20 feet. Segments shall be separated by construction joints with provisions made at each joint for 1/4 inch expansion. When the curb or curb and gutter is constructed next to cement concrete pavement, the construction joint adjacent to the end of pavement slab shall line up with the pavement joint.

2. Expansion Joints. Expansion joints 3/4 inch in width shall be formed with pre-molded resilient joint filler placed at intervals shown on the plans or specified by the drawings. The filler material shall be cut to conform to the cross section of the curb or curb and gutter. When curb or curb and gutter is cast adjacent to cement concrete pavement constructed with expansion joints, expansion joints in the curb or curb and gutter shall be located at expansion joints in the pavement.

3. Forms. Forms shall be steel or wood, straight, free from warp, and of such construction that there will be no interference to inspection for grade or alignment. All forms shall extend for the full curb depth and shall be braced and secured adequately so that no displacement from alignment will occur during placing of concrete.

4. Concrete Placing and Vibrating. Concrete shall be placed in the forms in accordance with the applicable requirements and shall be compacted with an approved, immersion type mechanical vibrator. The vibrator shall be of the size and weight capable of thoroughly vibrating the entire mass without damaging or misaligning the forms and shall be approved by the Contracting Officer’s Technical Representative. Forms shall be left in place for 24 hours or until the concrete has sufficiently hardened, as determined by the Contracting Officer’s Technical Representative, so that they can be removed without injury to the curb or curb and gutter. Upon removal of the forms, the exposed faces of the curb or

curb and gutter shall be immediately rubbed to a uniform surface. Rubbing shall be accomplished by competent finishers. No plastering will be permitted.

5. Concrete Curing. Curing of the curb or curb and gutter shall comply with the requirements of Curing. Minimum curing periods for the various types of curing materials used shall comply with the requirements. A clear membrane curing compound with fugitive dye may be used in lieu of a white-pigmented membrane.

6. Protection. The contractor shall keep the curb or curb and gutter clean, aligned, and protected from damage until final acceptance of the work. Any curb or curb and gutter damaged prior to the final acceptance of the work shall be repaired or replaced.

B. Machine Formed Concrete Curb or Curb and Gutter.

1. Machine Forming. Curb or curb and gutter shall be machine formed to the proper line and grade. The Contracting Office may require the contractor to demonstrate that the specific equipment he proposes to use is capable of satisfactorily placing the concrete mix. Any curb or curb and gutter placed outside of tolerance of 1/2 inch of the established line or 1/4 inch of the established grade shall be removed and replaced.

2. Contraction Joints. Contraction joints shall be formed or saw-cut to a width of 1/8 " minimum, maximum 1/4 ", and to a depth of 1 1/2 ". If saw-cut, this must be done within eight hours of placement. This cut shall extend slightly below the surface of the adjacent pavement and shall be spaced at twenty foot (20 ') intervals, or closer if directed by the Contracting Office's Technical Representative. When the curb or curb and gutter is constructed next to cement concrete pavement, the contraction joint in the curb or curb and gutter adjacent to the end of the pavement slab shall line up with the pavement joint. The saw-cut or formed joints shall be left unfilled.

3. Expansion Joints. Expansion joints 3/4 inch in width shall be formed with pre-molded resilient joint filler at intervals shown on the plans. The filler material shall be cut to conform to the cross section of the curb or curb and gutter. When the curb or curb and gutter is machine formed adjacent to cement concrete pavement constructed with expansion joints, expansion joints in the curb or curb and gutter shall be located at expansion joints the pavement.

4. Concrete Curing. Curing of the curb or curb and gutter shall comply with the requirements on Curing. A clear membrane curing compound with fugitive dye may be used in lieu of a white-pigmented membrane.

5. Protection. The contractor shall keep the curb or curb and gutter clean, aligned, and protected from damage until final acceptance of the work. Any curb

or curb and gutter damaged prior to the final acceptance of the work shall be repaired or replaced.

1.3.2. Concrete Curb—Integral. The specifications of 1.3.1., shall apply.

1.3.3. Precast Concrete Curb. The construction details shown on drawings shall apply.

1.3.4. Resetting Old Curb. The construction requirements of on the drawings shall apply with the following additions:

A. Care shall be taken in removing old curb so that there shall be no unnecessary breakage. All curb damaged in removing, hauling or storing, due to the carelessness of the contractor, shall be replaced with it new curb.

B. If directed to, all joints and tops shall be redressed to obtain a smooth top surface and to obtain joints of the same class as specified for new curb.

SECTION 03300

CONCRETE

PART 1 - GENERAL

1.0 RELATED WORK SPECIFIED ELSEWHERE

A. Testing Laboratory Services: Section 01410.

B. Excavation, Embankment and Compaction: Section 02223.

1.1 QUALITY ASSURANCE

1.1.1 Reference Standards: Comply with the applicable provisions and recommendations of the following, except as otherwise shown or specified.

A. ACI 301, Specifications for Structural Concrete for Building (includes ASTM Standards referred to herein except ASTM A36).

B. ACI 347, Recommended Practice for Concrete Formwork.

C. ACI 304, Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.

D. ACI 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures.

E. ACI 318, Building Code Requirements for Reinforced Concrete.

F. ACI 305R, Recommended Practice for Hot Weather Concreting.

G. ACI 306R, Recommended Practice for Cold Weather Concreting.

H. ASTM C618, Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

I. New York State Department of Transportation Standard Specifications - Construction and Materials, January 2, 1995.

1.2 SUBMITTALS

1.2.1 Laboratory Test Reports: Submit copies of all laboratory test reports for concrete as identified in Section 02000. Contracting Officer's review will be for general information only.

1.2.2 Production of concrete, to comply with specified requirements, is the responsibility of the contractor.

1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

1.3.1 All materials used for concrete must be kept clean and free from all foreign matter during transportation and handling and kept separate until measured and placed in the mixer. Bins or platforms having hard, clean surfaces shall be provided for storage. Suitable means shall be taken during hauling, piling, and handling to ensure that segregation of the coarse and fine aggregate particles does not occur and the grading is not affected.

1.3.2 Deliver concrete reinforcement materials to the site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

PART 2 - PRODUCTS

2.0 CONCRETE MATERIALS

2.0.1 Portland Cement: ASTM C150, Type I or Type II.

2.0.2 Aggregates: ASTM C33.

A. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps, or other deleterious substances.

B. Coarse Aggregate

1. Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:

a) Crushed stone, processed from natural rock or stone.

b) Washed gravel, either natural or crushed.

2.0.3 Coarse Aggregate Size: Size to be ASTM C33, Nos. 57 or 67, unless permitted otherwise by Contracting Officer.

2.0.4 Water: Clean, drinkable.

2.0.5 Air-Entraining Admixture: ASTH C260.

2.0.6 Water-Reducing Admixture: ASTM C494. Only use admixtures which have been tested and accepted in mix designs.

2.0.7 Fly Ash: Conform to ASTM C618, Type F. except that maximum loss on ignition shall be 4 percent. Fly ash to be used shall meet requirements of Section 711-10 "Fly Ash" of New York State Department of Transportation Standard Specifications - Construction and Materials.

2.1 FORM MATERIALS

2.1.1 Provide form materials with sufficient stability to withstand pressure of placed concrete without bow or deflection.

2.1.2 Ties

A. Non-architectural Surfaces: Use snap-ties, tie rods, taper rods, whaler-rods, or comb snaps as required for strength.

B. External holding devices for ties shall be of sufficient area to prevent crushing of the form lumber.

C. Tie ends shall not be exposed at the surface of the concrete.

D. Depth of break back shall be 1 inch minimum.

E. Maximum diameter is 1/4 inch.

2.1.3 Form Coatings

A. Provide commercial formulation form coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds. For concrete surfaces which will be in contact with potable water, the form coating shall be a mineral oil base coating.

2.1.4 Sealant: One part silicone sealant as recommended by form manufacturer.

2.2 REINFORCING MATERIALS

2.2.1 Reinforcing Bars: ASTM A615, including Supplementary Requirement S1, Grade 60, except stirrups and ties shall be Grade 40 for ease of bending.

2.2.2 Welded wire Fabric: ASTM A185.

2.3 RELATED MATERIALS

2.3.1 Concrete Curing Materials

A. Mats: ASTM C440 "Cotton Mats for Curing Concrete."

B. Moisture Retaining Coverings

1. Waterproof Paper Polyethylene Filmor White Burlap- Polyethylene Sheet: ASTM C171 "Sheet Materials for Curing Concrete."

C. Curing Compound: ASTM C-309. The compound shall be a dissipating resin curing compound. The compound must chemically break down in a two to four week period after application. Approved product is "Kurez DR" by The Euclid Chemical Company, or as approved.

D. Curing and Sealing Compound: ASTM C-309, Type I. The compound shall be a clear styrene acrylate type, 30 percent solids content minimum, and have a test loss of 0.030 grams per square centimeter when applied at a coverage rate of 300 square feet per gallon. Compound shall be "Super Rez-Seal" by The Euclid Chemical Company or "Masterkure" by Master Builders. Manufacturer's certification required.

2.3.2 Joint Fillers: Preformed expansion joint filler complying with ASTM D1751-83.

PART 3 - EXECUTION

3.0 FORMWORK

3.0.1 Formwork: Construct so that concrete members and structures are correct size, shape, alignment, elevation, and position, complying with ACI 347.

3.0.2 Provide openings in formwork to accommodate Work of other trades. Accurately place and securely support items built into forms.

3.0.3 Clean and adjust forms prior to concrete placement. Apply form release agents or wet forms, as required. Retighten forms during and after concrete placement if required to eliminate mortar leaks.

3.1 REINFORCEMENT, JOINTS, AND EMBEDDED ITEMS

3.1.1 Reinforcement: Position, support, and secure reinforcement against displacement. Locate and support with metal chairs, runners, bolsters, spacers, and hangers, as required. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

3.1.2 Install welded wire fabric in as long lengths as practical, lapping at least one mesh.

3.1.3 Joints

A. Comply with ACI 301, Chapter 6, and as specified below.

B. Locate and install construction, isolation, and control joints as shown.

3.1.4 Installation of Embedded Items: Set-and build into the Work anchorage devices and embedded items required for other Work that is attached to, or supported by, cast-in-place concrete. Use setting diagrams, templates, and instructions provided under other Sections and other contracts for locating and setting.

3.2 CONCRETE AND PLACEMENT

3.2.1 Proportioning and Design of Mix

A. Minimum Compressive Strength at 28 Days: 4000 psi.

B. Minimum Cement Content: 564 pounds per cubic yard.

C. Normal Weight: 145 pounds per cubic foot.

D. Use air-entraining admixture in all concrete. Provide not less than 4 percent nor more than 8 percent entrained air for concrete exposed to freezing and thawing, and from 2 percent to 4 percent for other concrete.

E. Calcium Chloride: Do not use calcium chloride in concrete, unless otherwise authorized in writing by the Contracting Officer. Do not use admixtures containing calcium chloride where concrete is placed against galvanized steel.

F. Slump: 1 inch minimum, 4 inches maximum.

G. Fly Ash: contractor has the option to substitute fly ash for not more than 20 percent of the Portland cement weight that would be required to meet the 28-day concrete strengths if fly ash were not permitted. However, full compressive strength is required at 28 days. Water reducing agent is required if fly ash is used. Adjust air-entraining admixture as required for fly ash usage.

3.2.2 Job-Site Mixing: Use drum type batch machine mixer, mixing not less than 1-1/2 minutes for one cubic yard or smaller capacity. Increase mixing time at least 15 seconds for each additional cubic yard or fraction thereof.

3.2.3 Ready-Mixed Concrete: ASTM C94.

3.2.4 Slabs-on-Ground: Place concrete over dampened gravel layer.

3.2.5 Consolidate placed concrete using mechanical vibrating equipment with hand rodding and tamping, so that concrete is worked around reinforcement and other embedded items and into all parts of forms.

3.2.6 Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placement, and curing.

A. In cold weather comply with ACI 306.

B. In hot weather comply with ACI 305.

3.3 FINISHES ON FORMED SURFACES

3.3.1 Unexposed Surfaces

A. Applicable for all concrete surfaces concealed by other materials.

B. Remove all metal form ties and spreader cones.

C. Remove all fins, projections, and irregularities.

D. Patch holes left by rock pockets and by spreader cones with dry pack mix.

3.4 FINISHES OF FLATWORK

3.4.1 Floated Finish

A. Applicable for areas to receive brick pavers, broom or belt finish, additional concrete or ceramic fills, and areas that are not indicated or specified to-have other types of finishes.

B. Begin floating when:

1. Bleed water has evaporated or been removed from surface.

2. Slab has hardened sufficiently to sustain foot pressure with not more than 1/4 inch indentation.

C. Surface shall be consolidated with power driven floats, except that hand floating with wood or cork-faced floats will be permitted for those areas that are inaccessible to the power float.

D. Recheck slab surface for trueness.

E. Correct all irregularities and then refloat to a uniform, smooth, granular finish.

3.4.2 Broom or Belt Finish

A. Applicable for exterior exposed stairs, platforms, sidewalks, and as indicated on the Contract Drawings.

B. Follow the procedure for a “floated finish" in this section.

C. Immediately after floating, give a coarse scored texture by drawing a broom or burlap belt across the surface.

D. The scoring shall be transverse to the direction of foot traffic.

3.5 CURING

3.5.1 Curing operations shall begin immediately after completion of placing and finishing of the concrete. Curing shall continue for a minimum of 7 days at a temperature conducive to proper hardening of the concrete.

3.5.2 Curing shall be as follows:

A. For slabs to be left exposed and untreated, apply two coats of the approved "curing and sealing compound."

B. For formed concrete surfaces, keep forms wet until removed, then continue curing for remainder of specified period by applying one coat of the approved "curing compound.

3.5.3 Curing compound, curing and sealing compounds, and moisture retaining coverings shall be applied in accordance with the manufacturer's recommendations.

3.6 QUALITY OF CONCRETE WORK

3.6.1 Make all concrete solid, compact and smooth, and free of laitance, cracks, and cold joints.

3.6.2 All concrete for liquid retaining structures, and all concrete in contact with earth, water, or exposed directly to the elements shall be watertight.

3.6.3 Cut out and properly replace to the extent ordered by the Contracting Officer’s Technical Representative, or repair to the satisfaction of the Contracting Officer’s Technical Representative, surfaces which contain cracks or voids, are unduly rough, or are in any way defective. Thin patches or plastering will not be acceptable.

3.6.4 All leaks through concrete, and cracks, holes, or other defective concrete in areas of potential leakage, shall be repaired and made watertight by the contractor.

3.6.5 Repair, removal, and replacement of defective concrete as ordered by the Contracting Officer shall be at no additional cost to the Government.

SECTION 03400

FENCES

1.0 DESCRIPTION

This work shall consist of furnishing and erecting fencing and metal fence gates of the type and size, and at the locations shown on the drawings. Construction of fencing and gates shall be done in accordance with the specifications and drawings of each delivery order.

1.1 Fence Types

The fence shall be 6', 7', 8', and 10' as shown on the drawings of each delivery order and designated as follows:

1.2 Portland Cement Concrete for Bases. Portland Cement concrete used for bases shall conform to the requirements of section 03300 Concrete.

1.3 Wood Fencing. The contractor should use pressure treated wood meeting the requirements below:

> Wood posts and braces shall be southern yellow pine or native pine. All wood posts and braces shall be pressure treated with creosote oil or pentachlorophenol. The wood posts shall be subject to inspection before and during the treatment. They shall be sound, free from loose knots or decay and with no through checks on tops or butts. Posts shall be machine peeled to a smooth uniform appearance and free from all inner bark. The preservative pressure treatment shall be by the empty cell process.

1.4 Fence Gates.

> A. Gate Frames. Frames shall be constructed of tubular members welded at all comers or assembled with corner fittings. Where corner fittings are used gates shall have 3/8" nominal diameter truss rods to prevent sag or twist. Gate leaves shall have vertical intermediate bracing so that no vertical members are more than 8 feet apart. Gate leaves over 10 feet long shall have a horizontal brace or a 3/8 inch nominal diameter diagonal truss rod. Gate leaves over 16 feet shall have both a horizontal brace and a 3/8" nominal diameter truss rod. Gates shall be galvanized. Personnel gates shall be in 3', 3'-6", 4' width as shown on the drawings. Vehicle double gates shall be in 8', 10', 12' and 14' width as shown on the drawings. Gates shall include all posts, locks, hardware and hold opens.
>
> B. Gate Hinges. Hinges shall be weldable steel, cast steel or malleable iron 180° offset industrial type. The hinges shall not twist or turn under the action of the gate. The gates

shall be capable of being opened and closed easily by one person. Hinges and latches shall be galvanized.

C. Gate Latches. Latches, stops and keepers shall be provided for all gates. Latches shall have a plunger bar arranged to engage the center stop, except that single left gate openings with an opening of less than 10 feet may use a forked latch. Latches shall be arranged for locking and the contractor shall provide a lock with keys for each gate. Center stops shall consist of a device arranged to be set in concrete and to engage a plunger-bar of the latch of double leaf gates. No stop is required for single leaf gates. Keepers shall consist of a mechanical device for securing the free end of the gate when in the full open position.

2.0 CONSTRUCTION DETAILS

2.1 General. The contractor shall perform such clearing and grubbing as may be necessary to construct the fence to the required grade and alignment. At locations where breaks in a run of fencing are required, or at intersections with existing fences appropriate adjustment in post spacing shall be made to conform to the requirements for the type of closure indicated. Posts, braces, or anchors shall be imbedded in concrete. The contractor shall install temporary guys or braces as may be required to hold the posts in proper position until such time as the concrete has set sufficiently to hold the posts. Unless otherwise permitted, no materials shall be installed on posts or strain placed on guys and bracing set in concrete until seven days have elapsed from the time of placing the concrete. All posts shall be set vertically and to the required grade and alignment. Wire or fencing of the size and type required shall be firmly attached to the posts and braces in the manner indicated. All wire shall be stretched taut and be installed to the required elevations. Fences shall be grounded at 100’ intervals with 5/8” diameter 8’ copper clad steel grounding rods. Include #2 stranded bare copper cable to connect the rod to the fence, mechanical fasteners at fence and rod, and set rod and cable 6 inches below adjacent grade. At each location where an electric transmission, distribution or secondary line crosses any of the types of fences covered by these specifications, the contractor shall furnish and install a ground conforming to the requirements of subsection 9 of the National Electric Safety Code. Fence shall generally follow the contour of the ground, with the bottom of fence fabric no less than one inch nor more that six inches from the ground surface. Grading shall be performed where necessary to provide a neat appearance. Line posts shall be placed equidistant apart. End, corner, intermediate posts shall be included and shall be braced as shown on the drawings. When chain link fence is on a long curve intermediate posts shall be evenly spaced so that the strain of the fence will not bend the line posts. All end, corner, and intermediate posts shall be set plumb in concrete bases of the depth and diameter shown on the drawings. The contractor shall have the option of setting the line posts in concrete bases or using methods of driving and anchoring specified by the fence manufacturer. The concrete bases shall be rough cast in the ground around the posts. The top surfaces shall be domed to shed water and provide a neat workmanlike appearance when completed.

2.2 Chain-Link Fencing with Top Rail: Posts shall be set so they are equidistant with a maximum of 10 foot centers. All top rails shall pass through the base of the post caps and shall form a

continuous brace from end to end of each stretch of fence. Top rail lengths shall be joined with sleeve couplings with expansion sleeves provided at 100 foot intervals. Top rails shall be securely fastened to end posts by means of approved rail end connectors. Horizontal braces shall be provided at all intermediate posts, midway between the top rail and ground as shown on the drawings. Diagonal truss rods shall be installed with the horizontal braces as indicated on the drawings.

2.3 Chain-Link Fencing with Top Tension Wire. The construction details specified in subsection, Chain Link Fencing with Top Rail shall apply with the following modifications:

A. Top tension wire shall be installed as shown on the drawings.

B. All posts shall be spaced equidistant in the fence line on a maximum of 8 foot centers.

C. Additional pull posts shall be placed at the locations indicated. Brace assemblies shall be installed at each intermediate post as indicated on the drawings.

2.4 Vinyl Coated Chain-Link Fencing on Plastic Coated Frame. The construction details specified in subsection 03400-2.2 Chain-Link Fencing with Top Rail or subsection 03400-2.3 Chain-Link Fencing with Top Tension Wire shall apply with the following additions:

A. If any of the resin clad material specified under this item has the protective resin coating damaged so its effectiveness to prevent corrosion of the base material is impaired, the contractor shall repair such parts by applying one coat of an approved compound of a color to match original material.

2.5 Aluminum Posts. Aluminum posts shall be set in accordance with requirements pertaining to Fence Posts and Chain-Link Fencing with Top Rail or Chain-Link Fencing with Top Tension Wire and with the following additional requirement: The portions of aluminum posts that will be in contact with the concrete bases shall be coated with Zinc Chromate Primer.

2.6 Outriggers. Galvanized outriggers at 45 degrees from the vertical shall be provided as shown on the drawings and include 3 strands of barbed wire.

SECTION 03500

GUIDE SIGNS, TRAFFIC SIGNS AND SPECIAL DEVICES

1.0 DESCRIPTION

Under this work the contractor shall furnish and install Guide Signs, Traffic Signs and Devices in accordance with the drawings.

2.0 MATERIALS

Materials for Guide Signs, Traffic Signs and Devices shall meet the requirements for the following below:

Zinc Chromate Primer

Stainless Steel Connecting Products

Aluminum Sign Panels

Plywood Sign Panels

Reflective Sheeting (Materials Designation)

Acrylic Plastic Reflex Reflectors

Reflectorized Sheeting Sign Characters
(Types III, IV, V and VI)

Sign Posts and Footings

Stiffeners, Overhead Brackets and

Miscellaneous Hardware

Sign Supports

2.1 Posts.

2.1.1 Guide Signs. Posts for Aluminum or Plywood Guide Signs shall be either Aluminum Alloy or Galvanized Steel Posts

2.1.2 Traffic Signs. Posts for Traffic Signs and Devices shall be either Aluminum Alloy or Galvanized Steel.

2.1.3 Wood Posts. Wood posts shall be used where specifically called for in the drawings.

2.2 Sign Panels.

2.2.1 Guide Signs. Panels for guide signs shall be aluminum alloy 0.125 " thick meeting the requirements of Aluminum Sign Panels.

2.2.2 Traffic Signs. Panels for traffic signs, special signs and devices shall be aluminum alloy 0.100” thick meeting the requirements of Aluminum Sign Panels.

2.2.3 Plywood Panels Plywood panels shall consist of 3/4" plywood meeting the requirements of Plywood Sign Panels.

3.0 CONSTRUCTION DETAILS

3.1 General. Signs and panels shall be built in accordance with the details shown on the drawings and shall be in conformance with the requirements of the Manual of Uniform Traffic Control Devices.

3.2 Design Criteria.

3.2.1 Wind Loading. Design shall be as shown on the drawings.

3.2.2 Horizontal Sign Clearance. Horizontal sign clearance shall be as shown on the drawings.

3.2.3 Vertical Sign Clearance. Vertical sign clearance shall be as shown on the drawings.

3.2.4 Sign Face Layout. Sign face layout shall be in accordance with the following manuals:

A. The A.A.S.H.T.O. Manual for Signing and Pavement Marking of the National System of Interstate and Defense Highways, latest edition including revisions and interpretations.

B. Manual of Uniform Traffic Control Devices for Streets and Highways, latest edition.

C. New York State Manual of Uniform Traffic Control Devices, latest edition.

3.2.5 Detailed Layouts. Corner and border radii, if not specifically designated, shall be approximately one-eighth of the height of the sign but shall not exceed 12 inches. Sign borders shall be of the same type character as the sign legend and shall be approximately the same width as the stroke width of the major lettering on the sign unless indicated otherwise.

3.2.6 Sign Characters. Characters shall include letters, numerals, route shields, symbols and borders.

3.3 Sign Drawings. The contractor shall furnish catalog cuts for the signs.

3.4 Fabrication. Fabrication of all components and erection of the completed sign shall be done in a workmanlike manner and shall produce a finished sign installation to the satisfaction of the Contracting Office's Technical Representative. Holes may be punched or drilled; cut edges shall be smooth and true, and free from burrs or ragged breaks. All fabrication except for cutting or lower ends of embedded posts shall be done in the shop.

3.5 Erection. Ground mounted signs shall normally be erected so that the sign face is vertical and the intersection angle measured between the sign face and the centerline of the travel lane, which the sign serves shall be as shown on the drawings. The contractor shall use Cast-in-Place Foundations for sign assemblies with single posts. The size of the foundations shall be as shown on the drawings.

SECTION 03600

CLEANING, PREPARATION, AND PAINTING FOR REFLECTORIZED PAVEMENT MARKINGS

1.0 DESCRIPTION

This work shall consist of cleaning, preparing, and painting of portland cement and bituminous pavement surfaces for the application of reflectorized pavement marking materials.

2.0 MATERIALS

Materials and equipment for cleaning, preparing, and painting pavement surfaces shall be approved by the Contracting Officer. Painting materials shall be specifically designed for use as traffic marking paint. The contractor shall submit catalog cuts for these materials for approval.

3.0 CONSTRUCTION DETAILS

3.1 General. The work required to clean and prepare pavement surfaces shall be performed in accordance with these specifications and the drawings. Before any work is begun, a schedule of operations and proposed traffic control program shall be submitted for the approval of the Contracting Office. Markings and patterns shall be placed as shown on the drawings and in accordance with the New York State Manual of Uniform Traffic Control Devices. Also all paint shall be applied in accordance with the manufacturer's recommendations for use. The contractor shall establish marking line points at thirty foot intervals throughout the length of the pavement.

3.2 Cleaning Existing Pavement Markings. Existing pavement markings shall be cleaned for the purpose of:

A. Preparing the pavement surface for the application of new pavement markings in the same location as the existing markings.

B. To remove existing markings that are in good condition which, if allowed to remain, will interfere with or otherwise conflict with newly applied marking patterns. Cleaning means the removal of an existing marking.

C. Pavement markings shall be cleaned to the extent that 95 to 100% of the existing marking is removed. Removal operations shall be conducted in such a manner that no more than moderate color and/or surface texture change results on the surrounding pavement surface. When water-blasting is performed, pavement markings shall be applied no sooner than 24 hours after the blasting has been completed. Water-blasting shall not be allowed for cleaning markings requiring replacement within the same day as removal.

3.3 Application of Pavement Markings. Pavement markings shall be applied with atomizing spray type striping machines. The striping equipment may be either truck mounted or hand operated. All equipment shall be compatible with and suitable for the application of the type of paint being used. Applied markings shall have clean-cut edges, true and smooth alignment and a minimum uniform wet film thickness of 15 mils. Glass beads shall be applied uniformly over and into the wet paint film at the rate of 6 pounds per gallon of paint. Glass bead dispensers shall be of a type that will mechanically and automatically give such performance. Paint rollers or brushes may be used for marking areas, letters, symbols, stop bars, short temporary detours or other such areas. When rollers and brushes are allowed, glass beads shall be applied to the wet paint film at the specified rate and in a manner suitable to the Contracting Officer's Technical Representative.

SECTION 03700

UNDERGROUND ELECTRICAL WORK

1.0 GENERAL

1.1 Applicable Publications: The current edition and revision level of the publications listed below form a part of this specification to the extent referenced.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

C2-1984	National Electrical Safety Code

INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)

48-1975	Standard Test Procedures and Requirements for High Voltage Alternating Current Cable Terminations

NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA)

WC7-1982	Standard for Cross-Linking Thermosetting Polyethylene Insulated Wire and Cable

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

70	National Electrical Code (NEC)

RURAL ELECTRIFICATION ADMINISTRATION (REA)

345-6	Standard for Splicing Plastic Insulated Cables

UNDERWRITER'S LABORATORIES, INC. (UL)

6-1981	Rigid Metal Conduit
83-1983	Thermoplastic-Insulated Wires and Cables
467-72	Electrical Grounding and Bonding Equipment
486A-1980	Wire Connectors and Soldering Lugs for use with Copper Conductors

510-1982	Insulating Tape
514A-1983	Standard for Metallic Outlet Boxes
514B-1982	Stand for Fittings for Conduit and Outlet Boxes
651-1981	Schedule 40 and 80 Rigid PVC Conduit

1.1 GENERAL REQUIREMENTS:

1.2 Submit the following information to the Contracting Officer on AF Form 3000 for items as listed:

1.2.1 Manufacturer's Data and Shop Drawings for:

Conduit

Splice/Junction Box

Insulating Tape

Cable Lubricants

600 Volt Cable

600 Volt Circuit Breaker

1.2.2 Manufacturer's Instructions for installation, operation, maintenance, and recommended spare parts for:

Photocell

Photocell controls

Lighting contactor

1.2.3 Test Report indicating cable and ground resistance data.

2.0 MATERIALS AND EQUIPMENT

Materials and equipment shall conform to the respective specifications and standards and to the specifications herein. Electrical ratings shall be as indicated.

2.1. Conduit: All conduit to be direct buried shall be rigid metal conduit and comply with UL6, hot-dip galvanized, threaded type, size(s) as indicated.

2.1.1 Fittings and Outlet Boxes: Fittings and outlet boxes for use with steel conduit (RGS) shall be cast-metal with gasketed closures and comply with UL 514A & B.

2.1.2 Tape: Plastic insulating tape shall be capable of performing in a continuous temperature environment of 80 deg. C. and comply with UL 510.

2.1.3 Power Wire and Cable: For all 600v wire and cable installed under this project, conductor sizes are designated by American Wire Gauge (AWG). All conductors shall be copper, and the minimum conductor size shall be No.12 AWG, unless otherwise noted. Insulated conductors shall bear the date of manufacture imprinted on the wire insulation with other identification. Provide conductor identification with each enclosure where a tap, splice or a termination is made. Provide wires conforming to UL 83 , type THW or THHN. Only wire with "W" in the type designation shall be used in wet or damp locations.

2.1.4 Connectors and Terminals: Wire connections and terminals for use with copper conductors shall comply with UL 386A.

2.1.5 Pull Wire: Pull wire shall be No. 14 AWG hot-dip galvanized steel or plastic having a minimum tensile strength of 200 lb. in each empty conduit or duct. Minimum of 24-inches of slack shall be left at each end of pull wires.

2.1.7 Grounding and bonding equipment and methods shall comply with UL 467.

3.0 INSTALLATION

Underground cable installations shall conform to NFPA 70 (current edition) and ANSI C2.

3.1. Concrete for electrical requirements shall meet the provisions of 03300 of this specification.

3.1.1 Excavation, backfilling, and compaction for electrical requirements shall meet the provisions of 02250 of this specification.

3.1.2 Trenching: All cables that will be set in trenches are to be installed in RGS conduit. Excavate trenches in which conduit(s) are placed by hand or with mechanical trenching equipment and provide a minimum cable cover of 24-inches below finished grade. This will apply to all areas, paved and unpaved. A trench shall not be less than 6-inches wide, and shall be in a straight line between cable markers. Bends in trenches shall have a radius of not less than 36-inches. Where two or more conduits are laid parallel in the same trench, they shall be spaced laterally at least 3-inches apart. When rock is encountered, remove to a depth of a least 3-inches below the conduit and fill the space with sand or clean earth free from particles larger than 1/4-inch. Provide a plastic warning tape in the backfill approximately 12-inches below finished grade. The tape shall be yellow plastic with integral warning legend repeated continuously

throughout the entire length of the tape. Trenches for conduits shall be left open a maximum of five (5) days. Maintain a separation of not less than 12-inches of well tamped earth between new conduits and existing cables or metal piping that crosses.

3.1.3 Ends of cable shall be taped immediately after cutting to prevent moisture from entering the cable. Where the cable is not expected to be connected for at least 72-hours, the tape shall also be varnished.

3.1.4 Lubricants for assisting in the pulling of cables shall be those specifically recommended by the cable manufacturer. Cable lubricants shall be soapstone, graphite, or talc for rubber or plastic insulated cables. The lubricant shall not be deleterious to the cable sheath, jacket, or outer coverings.

3.1.5 Cable pulling tensions shall not exceed the maximum pulling tension recommended by the cable manufacturer.

3.1.6 Cable Terminating: Protect terminations of insulated lighting cables from accidental contact, deterioration of coverings and moisture by the use of terminating devices and materials. Install all terminations of insulated lighting cables and splices in accordance with the manufacturer's recommendations. Make terminations using materials and methods as indicated or specified herein or as designated by the written instructions of the cable manufacturer and termination kit manufacturer.

3.1.7 Splices for 600 volt class cables shall only be made in accessible locations, such as the hand hole in the lighting pole. Splices are to be made using a compression connector on the conductor and the splice is to be fully insulated and waterproofed.

3.1.8 Restoration: Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the trenching, storing of dirt, cable laying, pad construction and other work shall be restored to its original condition by top-soiling, fertilizing, liming, seeding, sodding, sprigging or mulching. The contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance.

3.1.9 Cable Testing: Prior to energizing 600 volt class cables, perform a continuity and Megger test. The Megger test is to be at 500 volts DC. Identify each cable and record the test results.

3.1.10 Grounding: All non-current carrying metallic parts of all lighting poles and fixtures installed under this contract are to be grounded as detailed on the drawings. The grounding source at each pole is to be the copper weld ground rod that is cast into in the concrete pole base. All ground connections are to be made with compression ground grid connector(s) as indicated.

3.1.11 Ground Resistance Test: A ground resistance measurement is to be performed at the location of each lighting pole. The maximum resistance to solid "earth" ground is not to exceed

25 ohms. Ground resistance measurement is to be done in accordance with recognized IEEE procedures. Record the measurement results.

3.1.12 Test Report: The test report is to contain the results of each cable tested as per 3.1.9, and each ground resistance test as per 3.1.11. The test report is to be submitted to the Contracting Officer within ten (10) working days after performance of the final test.

SECTION 03930
CONCRETE REHABILITATION

PART 1 GENERAL

This guide specification covers repair of portland cement concrete using epoxy resin grouts, mortars and concrete.

1.1 DEFINITIONS

1.1.1 Epoxy Resin Binder A two-component epoxy bonding system in low and medium viscosities used by itself as a primer or for producing epoxy concrete or mortars when mixed with aggregate.

1.1.2 Epoxy Concrete A combination of epoxy resin binder and fine and coarse aggregate used in the repair of spalling along joints or cracks, small surface spalls or "popouts."

1.1.3 Epoxy Mortar A combination of epoxy resin binder and fine aggregate used in the surface repair of non-structural cracks and filling of saw kerfs.

1.2 SUBMITTALS Submit the following Design Data: Catalog Cuts

1.3 WEATHER LIMITATIONS Halt work when weather conditions detrimentally affect the quality of patching or bonding concrete. Apply epoxy resin materials only when the contact surfaces are completely dry and if the atmospheric and surface temperature ranges are suitable for the specified epoxy material. Follow manufacturer's instructions for weather conditions and temperature ranges.

1.4 TRAFFIC CONTROL Do not permit vehicular or heavy equipment traffic on the pavement in the work area during the curing period. At the end of the curing period, light local traffic may be permitted on the pavement if approved by the Contracting Officer’s Technical Representative.

1.5 EQUIPMENT Use a container recommended by the epoxy manufacturer as the mixing vessel. Use a power drive (air or spark-proof) propeller type blade for mixing except that hand mixing may be used for small batches. Use equipment specified by epoxy manufacturer for field mixing of aggregates and epoxy resin.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 For temperatures above 50 degrees F: use a product similar to Quickcrete Concrete Surfacer.

2.1.2 For temperatures below 40 degrees F: use a product similar to Bindan's Mono-Patch Cold Set.

2. 2 Aggregate

Provide dry aggregate.

a. For epoxy concrete aggregate conforming to the following requirements:

Sieve Designation	Percent Passing by Weight
3/8 in.	100
No. 4	93-100
No. 8	70-80
No. 16	50-65
No. 30	37-53
No. 50	20-37
No. 100	10-20
No. 200	5-10

b. For epoxy mortar aggregate conforming to the following requirements:

No. 30	100-80
No. 50	40-27
No. 100	10-20
No. 200	5-10

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Epoxy Concrete

3.1.1.1 Patch Areas Remove loose concrete from the spalled areas indicated. Inspect the cavity for remaining defective concrete by tapping with a hammer or steel rod and listening for dull or hollow sounds. In areas where tapping does not produce a solid tone, remove additional concrete until testing produces a solid tone. Make the entire cavity at least 25 mm (one inch) deep. Saw-cut edges of cavity to avoid feather edging. Prepare surface of cavity by sandblasting, grinding, or water blasting. Remove dust, dirt, and loosely bonded material resulting from cleaning. Ensure cavity surfaces are dry.

3.1.1.2 Spalls at Joints and Cracks For spalls to be repaired that are adjacent to joints and working cracks insert preformed joint filler to the working faces of the spall. Trim filler to fit

shape of the working faces of joint or crack so epoxy material is prevented from bypassing filler. Where practicable, extend filler horizontally and vertically into joint or crack opening. Secure filler strip in place prior to and during placement of epoxy concrete. After the epoxy concrete has completely cured, saw out the top 25 mm (1 inch) of the preformed joint filler and install liquid joint sealer in accordance.

3.2 MIXING MATERIALS Make batches small enough to ensure placement before binder sets. Mix materials in accordance with manufacturer's recommendations.

3.3 PLACEMENT Place materials in accordance with manufacturer's recommendations.

3.4 CURING Cure epoxy materials in accordance with manufacturer's recommendations.